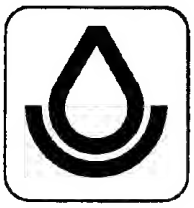
SOIL SURVEY

Baltimore County Maryland



UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
MARYLAND AGRICULTURAL EXPERIMENT STATION

Major fieldwork for this soil survey was done in the period 1940–69. Soil names and descriptions were approved in 1970. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1970. This survey was made cooperatively by the Soil Conservation Service and the Maryland Agricultural Experiment Station. It is part of the technical assistance furnished to the Baltimore Soil Conservation District. Fieldwork was partly financed by Baltimore County Health Department and Baltimore County Office of Planning and Zoning.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, United States Department of Agriculture, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms, ranches, and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for agriculture, industry, and recreation.

Locating Soils

All the soils of Baltimore County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the page for the woodland subclass in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the woodland subclasses.

Foresters and others can refer to the section "Use of the Soils as Woodland" where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Use of the Soils for Wildlife."

Community planners and others can read about soil properties that affect the choice of sites for nonindustrial buildings and for recreation areas in the section "Town and Country Planning."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain estimates of soil properties and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Genesis, Morphology, and Classification of Soils." They may also be interested in the information about the county given in the section "General Nature of the County."

Contents

Issued March 1976

SOIL SURVEY OF BALTIMORE COUNTY, MARYLAND

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SOILS SURVEYED BY R. H. ANDERSEN, J. M. GRANVILLE, J. S. HARDESTY, M. F. HERSHBERGER, L. A. ILGEN, R. S. LONG, J. R. PITZENBERGER, W. U. REYBOLD III, J. D. SHEETZ, J. C. F. TEDROW, AND P. J. WALTER, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE MARYLAND AGRICULTURAL EXPERIMENT STATION

BALTIMORE COUNTY is in the heart of Maryland, virtually surrounding Baltimore City but not including it (fig. 1). The county is bounded on the north by Pennsylvania's York County, on the east by Harford County, on the south by Anne Arundel County and on the southwest by Howard County, and on the west by Carroll County. One hundred and seventy-three miles of its southern extremity fronts on, and is enhanced by, the tidal waters of the Chesapeake Bay.

The county extends approximately 36 miles from north to south and 27 miles from east to west. It has a total area of 390,400 acres, or 610 square miles. Towson, the county seat, is about 8 miles north of downtown Baltimore City, 30 miles north of Annapolis, the State Capital, and 42 miles northeast of Washington, D.C. Baltimore County contains no incorporated cities or towns, all governmental functions being performed by the county.

About one-third of the county is in farms. No single type of farming is dominant. Dairy and other livestock operations are important. The main field crops grown are those used to feed livestock. They include corn grown for silage and grain, wheat, barley, some oats and rye, and a large acreage of grass-legume hay. Many small vegetable farms are located south of U.S. Route 1 where products are grown that are sold on the Baltimore fresh produce market. Vegetable crops grown north of U.S. Route 1 generally are used by the canning industry. Nursery and greenhouse products add greatly to the total dollar value of farm products grown and sold in Baltimore County. There are many poultry operations and a few fruit growers and other specialty farms.

Approximately 36 percent of the county is wooded. Much of the woodland is scattered through the farming area and is used to supplement farm income. Baltimore City maintains large woodland tracts in Baltimore County that protect the watersheds of three large municipal reservoirs. Baltimore County has small woodland holdings that are in the county parks system. Some woodland is owned by the State. Most of it has been, or is being, developed as State parks, including Patapsco and Gunpowder State Parks.

Baltimore County is rapidly urbanizing. In 1961 the population passed the one-half million mark and has steadily increased. More than 5,600 commercial business firms, including heavy industry, are located in the county. Competition for varying land uses in the southern half of the county is intense.

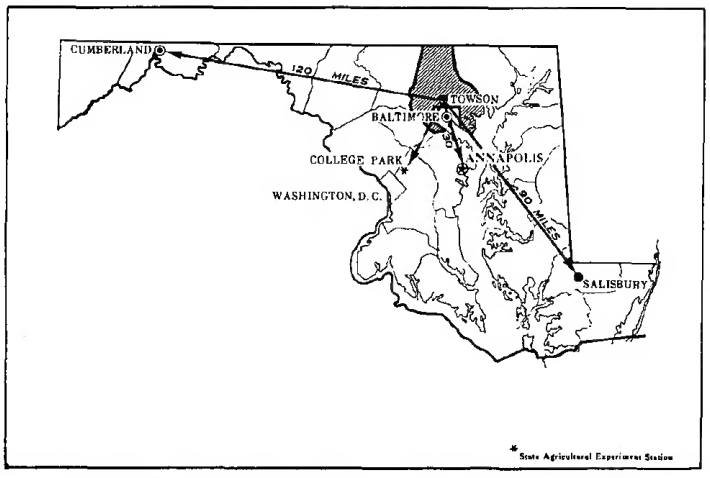

Figure 1.—Location of Baltimore County in Maryland.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Baltimore County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, the kinds of rocks, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uni-

form procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey (*12*).[1]

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Codorus and Baltimore, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Lenoir silt loam, 0 to 5 percent slopes, is one of several phases within the Lenoir series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map in the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Baltimore County—soil complexes and undifferentiated groups.

A soil complex consists of areas of two or more soils, so intermingled or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils, joined by a hyphen.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. The name of an undifferentiated group consists of the names of the dominant soils, joined by "and." Manor and Glenelg very stony loams, 3 to 15 percent slopes, is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Made land is a land type in Baltimore County.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way as to be readily useful to different groups of users, among them farmers, managers of woodland and rangeland, and engineers.

On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others, then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map[2]

The general soil map at the back of this survey shows, in color, the soil associations in Baltimore County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The nine soil associations in Baltimore County are discussed in the following pages.

1. Chester-Glenelg Association

Dominantly gently sloping to moderately steep, deep, well-drained soils that have a subsoil of silt loam to light silty clay loam; underlain by acid crystalline rock; on uplands

This association (fig. 2) is mostly in the northwestern part of the county, but smaller areas are in the central

[1] Italic numbers in parentheses refer to Literature Cited, p. 147.

[2] The general soil map and the soil association descriptions were prepared by RICHARD H. ANDERSEN, soil scientist, Soil Conservation Service.

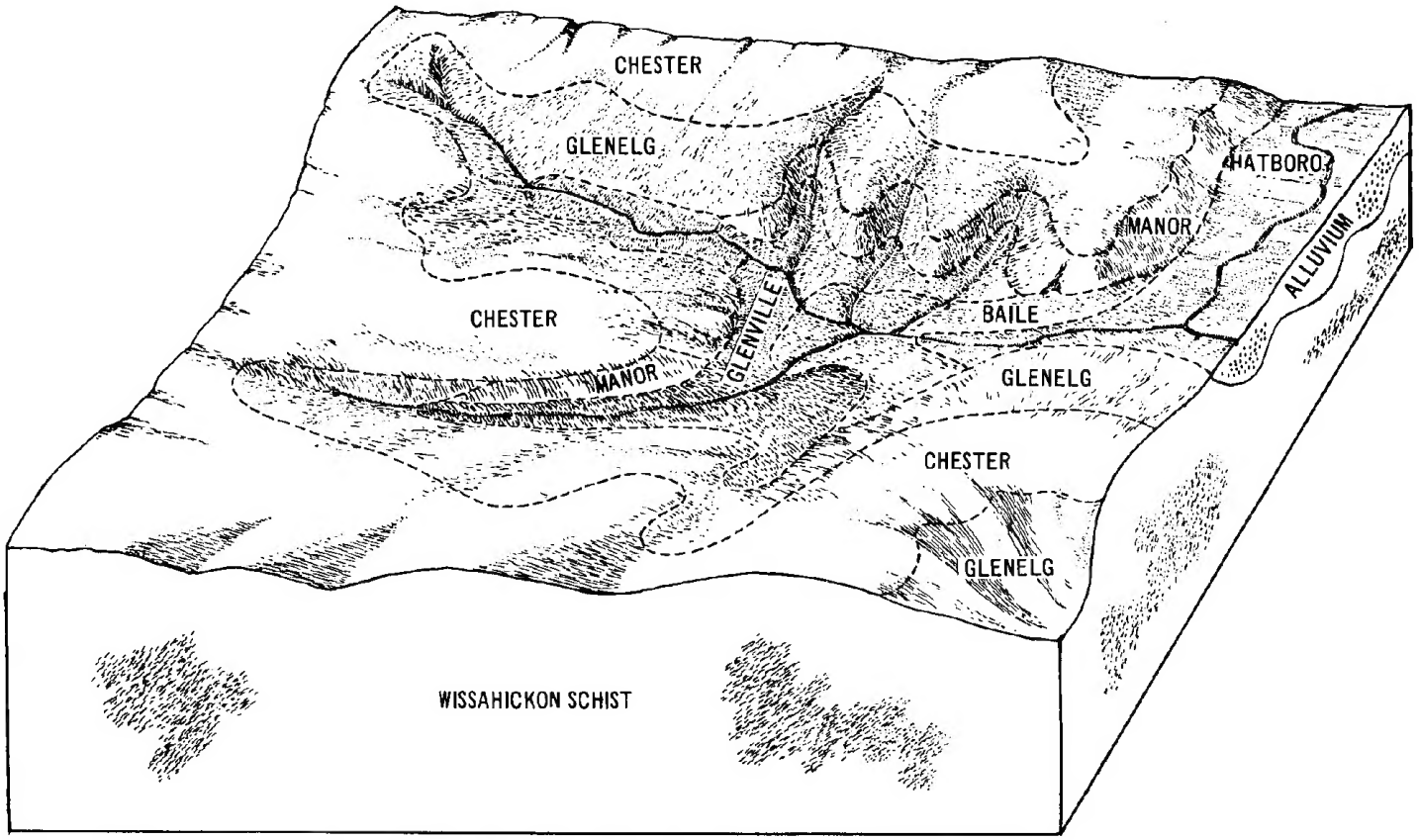

Figure 2.—**Cross section showing typical soil pattern in the Chester-Glenelg association.**

and western parts. The soils dominantly are gently sloping to moderately steep, and relatively few soils slope more than about 20 percent. Most soils are moderately eroded, but in a few areas they are severely eroded. Most of the acreage is cultivated and the rest is wooded.

This association occupies about 11 percent of the county. Chester soils make up about 60 percent of this association, Glenelg soils about 10 percent, and minor soils about 30 percent.

Chester soils are deep and well drained. They have a surface layer of brown or dark-brown silt loam and a subsoil of dark yellowish-brown and strong-brown silt loam. These soils are underlain by soft, decomposed mica schist, which grades to hard rock at a depth of between 5 and 10 feet.

Glenelg soils are deep and well drained. They have a surface layer of dark yellowish-brown loam and a subsoil that is commonly strong-brown and yellowish-red silty clay loam and clay loam. Their subsoil is not so thick as that of Chester soils. The Glenelg soils are underlain by soft, decomposed mica schist, which grades to hard rock at a depth of between 5 and 10 feet. The content of fine mica is greater in Glenelg soils than in Chester soils, and Glenelg soils generally are less gently sloping.

Minor soils in this association are in the Baile, Codorus, Glenville, Hatboro, and Manor series. These soils are mostly in small areas within areas of major soils, and they do not appreciably affect the general use of the association. Baile and Glenville soils are in draws and around heads of drainageways. Codorus and Hatboro soils are on flood plains. Manor soils are on uplands and are gently sloping to steep.

Dairy farming is the major enterprise on soils in the northern part of this association. Breeding and producing horses and beef cattle are of major importance in other areas. The chief crops are hay, pasture plants, and feed grain. Residential areas are prominent near the city of Baltimore. Soils in this association have few limitations except those caused by the hazard of erosion on some of the steeper soils.

2. Manor-Glenelg Association

Gently sloping to very steep, deep, well-drained and somewhat excessively drained soils that have a subsoil of loam to light silty clay loam; underlain by acid crystalline rock; on uplands

This association is mostly in parts of the county that are north or west of the city of Baltimore. The soils range from gently sloping on some ridgetops to very steep in areas bordering some deep ravines. Most areas are moderately eroded, but nearly 25 percent of the association is severely eroded. About 6 percent of the association is very stony. Large areas are in farms that are fairly well managed to well managed. A large part of the association is wooded, especially in steep and in stony areas.

Areas suburban to Baltimore City are largely used for residential and other nonfarm purposes.

This association occupies about 53 percent of the county. It is about 40 percent Manor soils, about 25 percent Glenelg soils, and about 35 percent minor soils.

Manor soils are well drained to somewhat excessively drained. These soils have a surface layer of reddish-brown loam and a subsoil of yellowish-red loam underlain by loose micaceous loam that grades to hard micaceous rock at depths of 5 to more than 10 feet. Manor soils are limited in use mostly by slope and erosion conditions, moderate available moisture capacity, and locally by stoniness.

Glenelg soils are well drained. These soils have a surface layer of dark yellowish-brown loam and a subsoil of strong-brown and yellowish-red silty clay loam or clay loam underlain by loose micaceous loam that grades to hard micaceous rock at a depth generally between 5 and 10 feet. Glenelg soils have fewer limitations than Manor soils because they generally are less steep and less eroded, hold more moisture for plants, and commonly are less stony.

Minor soils in this association are mostly in the Chester, Elioak, Mt. Airy, Glenville, Baile, Codorus, and Hatboro series. Chester, Elioak, and Mt. Airy soils are mainly on ridgetops and upper slopes. Glenville soils and Baile soils are in draws and around the heads of drainageways. Codorus and Hatboro soils occupy flood plains. These minor soils are mostly in small areas within the major soils, and they do not strongly affect overall use of the soil association.

The breeding and production of horses and beef cattle and the production of crops suitable for canning are the major agricultural enterprises. The most important crops, therefore, are hay, pasture plants, feed grains, and vegetables.

3. Baltimore-Conestoga-Hagerstown Association

Dominantly level to moderately sloping, deep, well-drained soils that have a subsoil of clay loam to clay; underlain by limestone, marble, or calciferous schist; in valleys

This association is in the generally narrow limestone valleys that extend irregularly over a large part of the central part of the county. The soils are mostly gently sloping, but some are nearly level and others are moderately sloping. Nearly all of this area is moderately eroded. Most of the acreage is made up of farms (fig. 3).

This association occupies about 8 percent of the county. It is about 28 percent Baltimore soils, 22 percent Conestoga soils, and 5 percent Hagerstown soils. The remaining 45 percent is minor soils.

Baltimore soils have a surface layer of dark reddish-brown silt loam and a subsoil of yellowish-red to red clay loam.

Conestoga soils have a surface layer of dark yellowish-brown loam and a subsoil of strong-brown clay loam or silty clay loam.

Hagerstown soils have a surface layer of reddish-brown silt loam and a subsoil of red clay.

Minor soils in this association are in the Captina, Codorus, Dunning, Hollinger, Lindside, and Melvin series. Codorus, Dunning, Lindside, and Melvin soils are on flood plains. Minor soils on flood plains have a significant effect on the overall use of the association, as they are well suited to hay crops and pasture. Hollinger soils are similar to Conestoga soils but have a thinner subsoil and stronger slopes. Some of the Hollinger and Conestoga soils are rocky. Captina soils are on stream terraces.

Dairy farming and breeding and producing horses and beef cattle are the major enterprises on this association. Cash grain crops and truck crops for canning are also

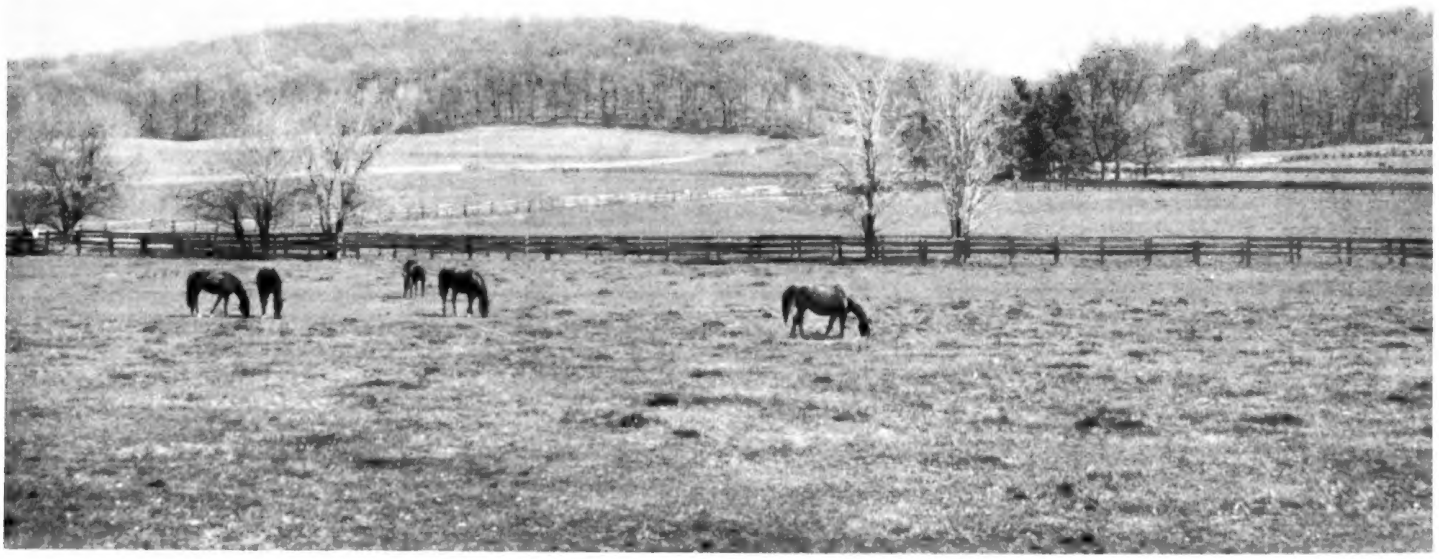

Figure 3.—Bluegrass pasture in a valley of the Baltimore-Conestoga-Hagerstown association. Ridge in background is part of Manor-Glenelg association.

important. The main crops for canning are lima beans, snap beans, English peas, and sweet corn. The major soils have few limitations except those caused by slope and the hazard of erosion. The hazard of erosion is moderate on most of this association.

4. Chrome-Watchung Association

Dominantly sloping to steep, shallow, well-drained soils that have a subsoil of silty clay loam and level to gently sloping, poorly drained soils that have a subsoil of silty clay; underlain by basic rock; on uplands

This association is in two small areas in the county. One is north of the Baltimore City line and the other is east of Liberty Reservoir between Reisterstown and Holbrook. The relief is mostly sloping to steep, but it has many depressions, particularly around the heads of drainageways. The sloping to steep areas are mostly severely eroded; the depressed areas are mostly uneroded. Most of this association is uncultivated, and is either idle or under a poor cover of trees, mostly Virginia pine.

This association occupies less than 1 percent of the county. It is about 65 percent Chrome soils, about 20 percent Watchung soils, and about 15 percent minor soils.

Chrome soils are well drained. They have a surface layer of about 15 inches of dark yellowish-brown heavy silty clay loam overlying serpentine rock. Rock outcrops are widespread. Watchung soils are poorly drained. They have a surface layer of dark grayish-brown silt loam, and a subsoil that is dominantly gray, mottled, silty overlying serpentine, diabase, or other basic rock. Chrome soils have severe limitations to use because of shallowness, slope, and erosion hazard.

Watchung soils have severe limitations to use because of wetness and poor natural drainage. Artificial drainage is difficult to install.

Minor soils in this association are mostly in the Relay, Legore, Neshaminy, and Montalto series, all of which are well drained and deep. They are moderately sloping to steep soils. Some of these soils, which are in small individual areas, are cultivated mostly for gardens or subsistence crops.

5. Legore-Aldino-Neshaminy Association

Gently sloping to steep, deep, well-drained soils that have a subsoil of silty clay loam or clay loam and level to moderately sloping, moderately well drained soils that have a subsoil of silty clay loam and a fragipan; underlain by basic rock; on uplands

This association is in the area west and southwest of Baltimore City and, with some interruptions, is in a belt extending from Overlea northeastward to Kingsville and to the Harford County line. The relief ranges from level to steep. Most of the soils are moderately eroded, and some are severely eroded. About 12 percent of the association is stony. Farming is declining in this association as suburban development expands.

This association occupies about 8 percent of the county. It is about 30 percent Legore soils, about 13 percent Aldino soils, about 11 percent Neshaminy soils, and about 46 percent minor soils.

Legore and Neshaminy soils are well drained. Legore soils have a surface layer of dark grayish-brown to yellowish-brown silt loam or silty clay loam and a subsoil of brown to yellowish-red silty clay loam. Neshaminy soils have a surface layer of dark-brown to strong-brown silt loam and a subsoil of yellowish-red clay loam or silty clay loam. The combined thickness of surface layer and subsoil generally is less than 3 feet in Legore soils but is more than 3 feet in Neshaminy soils. Legore and Neshaminy soils have only slight to moderate limitations to use, except in steep, severely eroded, or stony areas.

Aldino soils are moderately well drained. They have a surface layer of grayish-brown to brown silt loam and a subsoil of yellowish-brown to dark greenish-gray silty clay loam. The subsoil has grayish colors in the lower part, indicating seasonal wetness. The lower part of the subsoil is firm and brittle and is only slowly permeable. Aldino soils have moderate to severe limitations for most uses because of seasonal wetness, slow movement of moisture through the subsoil, and local stoniness.

The minor soils in this association are mostly of the Codorus, Elsinboro, Hatboro, Kelly, Montalto, Relay, and Watchung series. The Elsinboro soils commonly are adjacent to flood plains. Montalto and Kelly soils are gently sloping to moderately sloping, and Watchung soils are level to gently sloping soils on uplands. Relay soils are similar to Legore soils but have an olive-colored subsoil. Codorus and Hatboro soils occupy flood plains. These minor soils generally are small areas within the major soils, and do not strongly affect the overall use of the soil association.

There are some general farming and livestock enterprises in this association, but, except for horse breeding, the trend is toward nonfarm uses.

6. Beltsville-Chillum-Sassafras Association

Level to moderately sloping, moderately well drained soils that have a subsoil of silt loam or silty clay loam and a fragipan, and well-drained soils that have a subsoil of sandy clay loam to silt loam; underlain by thick stratified sediment; on uplands

This association is mostly in the eastern part of the county in an irregular belt from Parkville northeastward to the vicinity of Perry Hall, Loreley, and Upper Falls. Other important parts of the association are near Catonsville and north of Towson. The relief is mostly gently sloping, but there are a few slopes greater than 10 percent. Most of these soils are only slightly to moderately eroded, and there are small inclusions of soils that are severely eroded. Farming is declining in this association as suburban development expands.

This association occupies about 5 percent of the county. It is about 25 percent Beltsville soils, about 10 percent Chillum soils, about 10 percent Sassafras soils, and 55 percent minor soils.

Beltsville soils are moderately well drained. They have a surface layer of pale-brown to grayish-brown silt loam and a subsoil of yellowish-brown silt loam or silty clay loam. The subsoil is variegated or mottled in the lower part, indicating seasonal wetness. This lower part

of the subsoil is firm and brittle and is only slowly permeable by water. Beltsville soils have moderate to severe limitations for most uses because of seasonal wetness and the slow movement of moisture through the subsoil.

Chillum soils are well drained. They have a surface layer of dark grayish-brown silt loam and a subsoil of yellowish-brown silt loam; the subsoil is underlain by a hardened layer of gravelly loam. Sassafras soils are well drained. They have a surface layer of brown loam or sandy loam and a subsoil of yellowish-red to strong-brown sandy clay loam; the subsoil is underlain by loose sandy material. Chillum and Sassafras soils have only slight to moderate limitations for most uses.

Most of the soil series of the Coastal Plain part of the county are minor inclusions in this association. Among the more important of these are the level to moderately sloping Matapeake and Mattapex soils and the gently sloping to steep Joppa soils. There are also important inclusions of the nearly level to steep Loamy and clayey land. Because the total acreage of the minor soils is greater than that of the three major soils in this association, the minor soils tend to strongly modify, at least locally, the overall land use of the association.

Truck crops for market or for canning are an important enterprise on this association, although the total acreage is not large. The trend of land use is away from farming.

7. Loamy and Clayey Land-Lenoir-Beltsville Association

Nearly level to steep land of sandy loam to clay loam over clay and somewhat poorly drained and moderately well drained soils that have a subsoil of dominantly silty clay loam and silt loam; underlain by thick stratified sediment; on uplands

This association is mostly in two areas. One is along U.S. Highway 40 and Interstate 95 from the Baltimore City line northeastward to the vicinity of White Marsh. The other is the area south of Baltimore, from the city line to the Patapsco River. The relief is mostly irregular. Loamy and clayey land ranges from nearly level to steep, and Lenoir and Beltsville soils are no more than moderately sloping. Erosion hazard ranges from slight to severe. Farming has not been extensive and has further declined as suburban development has expanded.

This association occupies about 5 percent of the county. It is about 50 percent Loamy and clayey land, about 16 percent Lenoir soils, about 10 percent Beltsville soils, and about 24 percent minor soils.

Loamy and clayey land is highly variable in the nature and thickness of the surface material. This is a mantle ranging from gravelly sandy loam to clay loam in texture. The mantle ranges from a few inches to several feet in thickness. The underlying material is plastic and sticky clay, of many colors dominated by red, and is very unstable. The clay tends to slump, slide, or flow when it is wet and subject to pressure, as from large buildings, etc., and tends to shrink and settle when dry. This land is of limited use in agriculture, and has severe limitations for most other uses.

Lenoir soils are somewhat poorly drained. They have a surface layer of grayish-brown loam or silt loam or of yellowish-brown silty clay loam. The upper part of the subsoil is mottled with grayish colors and is yellowish-brown heavy silty clay loam. The lower part of the subsoil is mottled with brighter colors and is gray to light brownish-gray silty clay or silty clay loam. The mottled subsoil indicates wetness for fairly long periods of time; it is slowly permeable by water. Lenoir soils have severe limitations for most uses because of seasonal wetness and the slow movement of moisture through the subsoil.

Beltsville soils are moderately well drained. They have a surface layer of pale-brown to grayish-brown silt loam, and a subsoil of yellowish-brown silt loam or silty clay loam. The subsoil is variegated or mottled in the lower part, indicating seasonal wetness. The lower part of the subsoil is firm and brittle and is only slowly permeable by water. Beltsville soils have moderate to severe limitations for most uses because of seasonal wetness and the slow movement of moisture through the subsoil.

The minor soils in this association include all other soils that are in the Coastal Plain part of the county. Many of them are better suited to farming and other uses than the major soils.

Some truck crops are grown on this association but are confined mostly to small areas on some of the better minor soils.

8. Sassafras-Woodstown-Fallsington Association

Well drained, moderately well drained, and poorly drained soils that have a subsoil of sandy clay loam; underlain by thick stratified sediment; on uplands

This association (fig. 4) is in several irregular and disconnected areas, mostly east of Baltimore and extending to the Chesapeake Bay. The relief is mostly level to gently sloping. Erosion is a moderate hazard on some of the Sassafras soils, but it is not an important problem on most of the association. There are few farms, and most of them are small.

This association occupies about 5 percent of the county. It is about 50 percent Sassafras soils, about 22 percent Woodstown soils, about 7 percent Fallsington soils, and about 21 percent minor soils.

All of the major soils in this association have a moderately permeable subsoil of sandy clay loam. Sassafras soils are well drained. They have a surface layer of brown loam or sandy loam and a subsoil that is yellowish red to strong brown. Woodstown soils are moderately well drained. They have a surface layer of yellowish-brown loam or sandy loam and a yellowish-brown subsoil that has grayish mottles in the lower part. This subsoil mottling indicates seasonal wetness. Fallsington soils are poorly drained. They have a surface layer of light brownish-gray loam or sandy loam and a gray subsoil that has brighter colored mottles. The subsoil color indicates long periods of wetness and a high water table. The Sassafras soils have mostly slight limitations to use, Woodstown soils have moderate to severe limitations

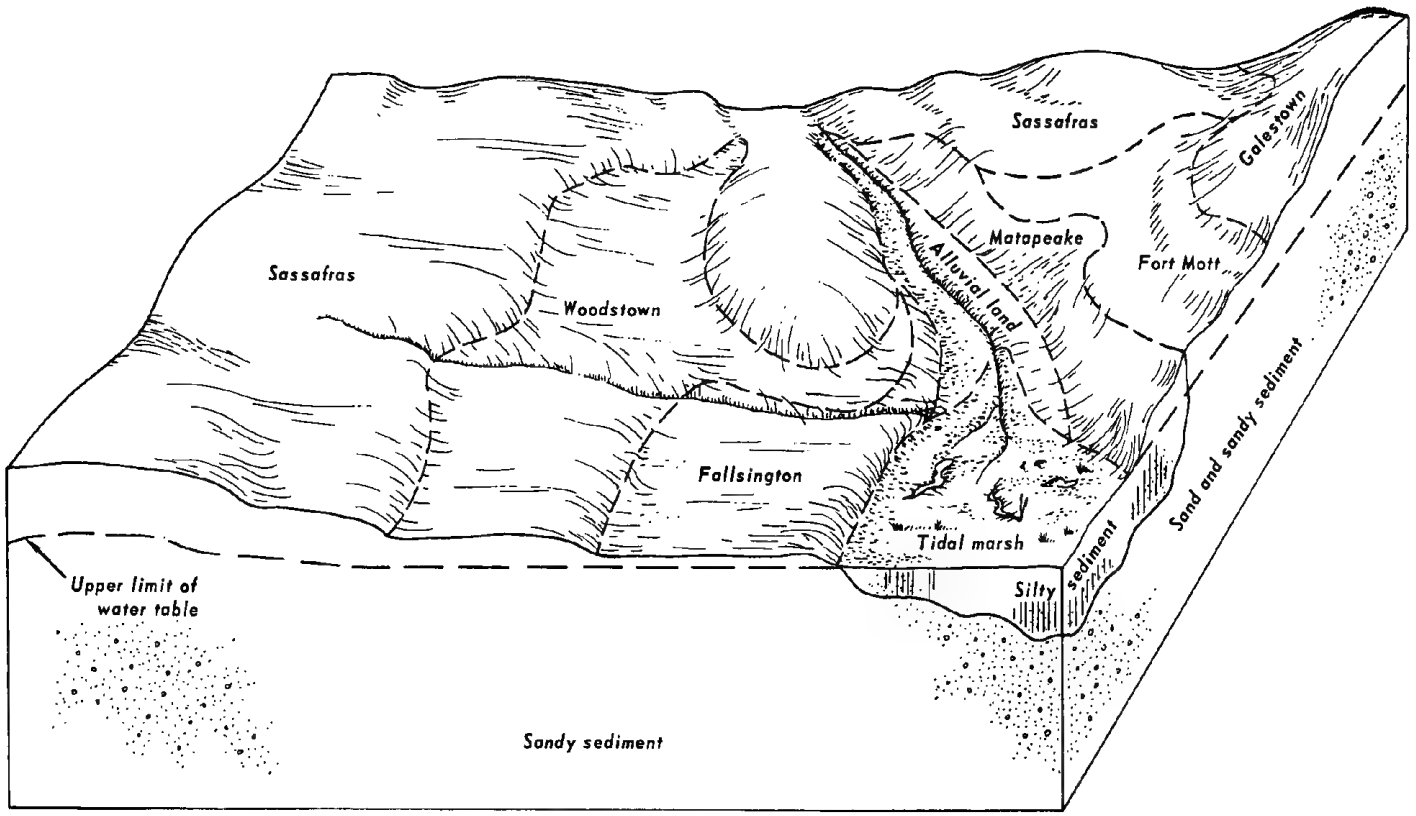

***Figure 4.*—Cross section showing typical pattern in the Sassafras-Woodstown-Fallsington association.**

for some uses, and Fallsington soils have severe limitations for nearly all uses.

The minor soils of this association are the level to moderately sloping Matapeake and Galestown, and the level to gently sloping Fort Mott. These soils do not strongly affect overall use of the soil association. They also include some Alluvial land and Tidal marsh.

Much of this association is used for either residential or industrial purposes. Truck crops are the main farming enterprise. Many areas that are not well drained are in woodland.

9. Mattapex-Barclay-Othello Association

Moderately well drained, somewhat poorly drained, and poorly drained soils that have a subsoil of silt loam or silty clay loam; underlain by thick stratified sediment; on uplands

This association is in several irregular and disconnected areas east of Baltimore and south of U.S. Highway 40, and extending to Chesapeake Bay. The relief is mostly nearly level, but some of it is gently sloping. There is little or no hazard of erosion. Farming is of minor importance. Residential and industrial developments cover most of the areas.

This association occupies about 4 percent of the county. It is about 50 percent Mattapex soils, about 10 percent Barclay soils, about 5 percent Othello soils, and about 35 percent minor soils.

All of the major soils in this association have a silt loam surface layer and a moderately slowly permeable subsoil of silt loam or silty clay loam. Mattapex soils are moderately well drained. They have a surface layer of dark grayish brown and a yellowish-brown subsoil that has grayish mottles in the lower part. Barclay soils are somewhat poorly drained. They have a dark-brown surface layer. The upper part of the subsoil is yellowish brown and has many grayish-brown mottles. The lower part of the subsoil is gray and has brighter colored mottles. Othello soils are poorly drained. They have a grayish-brown surface layer and a gray or light gray subsoil that has brighter colored mottles. Mattapex soils generally are wet for moderate periods, Barclay soils for fairly long periods, and Othello soils for very long periods of the year. Mattapex soils have moderate to severe limitations for some uses, and Barclay and Othello soils have severe limitations for most uses. These limitations are due to seasonal wetness, somewhat slow permeability, or both.

The minor soils in the association are mostly in the Matapeake, Sassafras, Woodstown, Lenoir, Fallsington, and Elkton series. Matapeake soils are level to moderately sloping. Sassafras soils are nearly level to steep. Woodstown soils are nearly level to gently sloping. Lenoir soils are moderately sloping. The Fallsington soils occupy flats on nearly level areas and the Elkton soils are on the nearly level upland flats. The association also includes some Alluvial land, Made land, and Tidal marsh.

Except for some truck crops, there is very little farming on this association. Industrial complexes cover as much as 75 percent of the area. Some of the wetter areas are in woodland.

Descriptions of the Soils

In this section the soils of Baltimore County are described in detail and their use and management are discussed. Each soil series is described in detail, and then, briefly, the mapping units in that series. Unless it is specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second is much more detailed and is for those who need to make thorough and precise studies of the soils. The profile described in the soil series is representative of mapping units in that series. If a given mapping unit has a profile in some ways different from the one described in the series, these differences are stated in the description of the mapping unit, or they are apparent in the name of the mapping unit. The description of each mapping unit contains suggestions on how soil can be managed.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. The land types, Coastal beaches and Made land, for example, do not belong to a soil series, but nevertheless are listed in alphabetic order along with the soil series. The approximate acreage and proportionate extent of the soils are given in table 1.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent	Soil	Acres	Percent
Aldino silt loam, 0 to 3 percent slopes	380	0.1	Chillum silt loam, 5 to 10 percent slopes, moderately eroded	610	0.2
Aldino silt loam, 3 to 8 percent slopes, moderately eroded	2,170	.6	Chillum silt loam, 5 to 10 percent slopes, severely eroded	190	(1)
Aldino silt loam, 8 to 15 percent slopes, moderately eroded	370	.1	Chillum-Neshaminy silt loams, 2 to 5 percent slopes, moderately eroded	690	.2
Aldino very stony silt loam, 0 to 15 percent slopes	190	(1)	Chillum-Neshaminy silt loams, 5 to 10 percent slopes, moderately eroded	570	.1
Aldino-Urban land complex, 0 to 8 percent slopes	1,020	.3	Chillum-Neshaminy gravelly silt loams, 10 to 15 percent slopes, moderately eroded	250	.1
Alluvial land	5,170	1.3	Chillum-Urban land complex, 0 to 5 percent slopes	1,450	.4
Baile silt loam, 0 to 3 percent slopes	2,030	.5	Chillum-Urban land complex, 5 to 15 percent slopes	1,030	.3
Baile silt loam, 3 to 8 percent slopes	1,820	.5	Christiana loam, 2 to 5 percent slopes	740	.2
Baltimore silt loam, 0 to 3 percent slopes	560	.1	Christiana loam, 5 to 10 percent slopes, moderately eroded	480	.1
Baltimore silt loam, 3 to 8 percent slopes, moderately eroded	6,590	1.7	Chrome silt loam, 3 to 8 percent slopes, moderately eroded	280	.1
Baltimore silt loam, 8 to 15 percent slopes, moderately eroded	1,480	.4	Chrome channery silty clay loam, 3 to 15 percent slopes, severely eroded	1,010	.3
Baltimore-Urban land complex, 0 to 8 percent slopes	330	.1	Chrome channery silty clay loam, 15 to 45 percent slopes, severely eroded	610	.2
Barclay silt loam	1,680	.4	Clay pits	110	(1)
Beltsville silt loam, 0 to 2 percent slopes	390	.1	Coastal beaches	60	(1)
Beltsville silt loam, 2 to 5 percent slopes	3,350	.9	Codorus silt loam	9,200	2.4
Beltsville silt loam, 5 to 10 percent slopes, moderately eroded	1,150	.3	Comus silt loam	810	.2
Beltsville-Urban land complex, 0 to 5 percent slopes	1,670	.4	Conestoga loam, 3 to 8 percent slopes, moderately eroded	4,700	1.2
Beltsville-Urban land complex, 5 to 10 percent slopes	450	.1	Conestoga loam, 8 to 15 percent slopes, moderately eroded	2,140	.5
Brandywine loam, 3 to 8 percent slopes, moderately eroded	790	.2	Delanco silt loam, 3 to 8 percent slopes	940	.2
Brandywine loam, 8 to 15 percent slopes, moderately eroded	1,700	.4	Dunning silt loam	630	.2
Brandywine gravelly loam, 15 to 25 percent slopes, moderately eroded	1,000	.3	Edgemont gravelly loam, 3 to 8 percent slopes, moderately eroded	200	.1
Brandywine gravelly loam, 15 to 25 percent slopes, severely eroded	690	.2	Edgemont gravelly loam, 8 to 15 percent slopes, moderately eroded	280	.1
Brandywine gravelly loam, 25 to 45 percent slopes	890	.2	Edgemont very stony loam, 8 to 25 percent slopes	360	.1
Captina silt loam, 0 to 3 percent slopes	420	.1	Edgemont very stony loam, 25 to 45 percent slopes	440	.1
Captina silt loam, 3 to 8 percent slopes, moderately eroded	620	.2	Elioak silt loam, 3 to 8 percent slopes, moderately eroded	4,180	1.1
Chester silt loam, 0 to 3 percent slopes	330	.1	Elioak silt loam, 8 to 15 percent slopes, moderately eroded	510	.1
Chester silt loam, 3 to 8 percent slopes, moderately eroded	18,020	4.6	Elioak gravelly silt loam, 3 to 8 percent slopes, moderately eroded	450	.1
Chester silt loam, 8 to 15 percent slopes, moderately eroded	3,490	.9	Elioak gravelly silt loam, 8 to 15 percent slopes, moderately eroded	250	.1
Chester gravelly silt loam, 3 to 8 percent slopes, moderately eroded	3,160	.8	Elioak silty clay loam, 8 to 15 percent slopes, severely eroded	190	(1)
Chester gravelly silt loam, 8 to 15 percent slopes, moderately eroded	2,720	.7	Elkton loam	290	.1
Chillum silt loam, 2 to 5 percent slopes, moderately eroded	1,340	.3	Elkton silt loam	640	.2

TABLE 1.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Acres	Percent
Elkton-Urban land complex	220	0. 1
Elsinboro loam, 3 to 8 percent slopes	1, 270	. 3
Elsinboro loam, 8 to 15 percent slopes, moderately eroded	450	. 1
Fallsington sandy loam	600	. 2
Fallsington loam	920	. 2
Fort Mott loamy sand, 0 to 5 percent slopes	570	. 1
Galestown loamy sand, 0 to 5 percent slopes	230	. 1
Galestown loamy sand, 5 to 10 percent slopes	160	(1)
Glenelg loam, 3 to 8 percent slopes, moderately eroded	24, 400	6. 1
Glenelg loam, 8 to 15 percent slopes, moderately eroded	17, 850	4. 6
Glenelg loam, 8 to 15 percent slopes, severely eroded	2, 030	. 5
Glenelg loam, 15 to 25 percent slopes, moderately eroded	1, 440	. 4
Glenelg loam, 15 to 25 percent slopes, severely eroded	740	. 2
Glenelg channery loam, 3 to 8 percent slopes, moderately eroded	2, 070	. 5
Glenelg channery loam, 8 to 15 percent slopes, moderately eroded	5, 180	1. 3
Glenelg channery loam, 15 to 25 percent slopes, moderately eroded	1, 740	. 4
Glenelg channery loam, 15 to 25 percent slopes, severely eroded	1, 120	. 3
Glenelg-Urban land complex, 0 to 8 percent slopes	3, 210	. 8
Glenelg-Urban land complex, 8 to 15 percent slopes	1, 370	. 3
Glenville silt loam, 0 to 3 percent slopes	1, 900	. 5
Glenville silt loam, 3 to 8 percent slopes	12, 030	3. 1
Glenville-Urban land complex, 0 to 8 percent slopes	390	. 1
Hagerstown silt loam, 0 to 3 percent slopes	280	. 1
Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded	1, 410	. 4
Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded	430	. 1
Hatboro silt loam	4, 160	1. 1
Hollinger loam, 3 to 8 percent slopes, moderately eroded	360	. 1
Hollinger loam, 8 to 15 percent slopes, moderately eroded	500	. 1
Hollinger and Conestoga loams, 15 to 25 percent slopes, severely eroded	360	. 1
Hollinger and Conestoga very rocky loams, 3 to 15 percent slopes	550	. 1
Iuka silt loam	530	. 1
Joppa gravelly sandy loam, 2 to 5 percent slopes	960	. 2
Joppa gravelly sandy loam, 5 to 10 percent slopes, moderately eroded	1, 370	. 3
Joppa gravelly sandy loam, 10 to 15 percent slopes, moderately eroded	490	. 1
Joppa-Urban land complex, 5 to 15 percent slopes	1, 510	. 4
Kelly silt loam, 3 to 8 percent slopes, moderately eroded	890	. 2
Kelly silt loam, 8 to 15 percent slopes, moderately eroded	240	. 1
Kelly very stony silt loam, 0 to 15 percent slopes	240	. 1
Kelly-Urban land complex, 0 to 8 percent slopes	300	. 1
Legore silt loam, 3 to 8 percent slopes, moderately eroded	1, 170	. 3
Legore silt loam, 8 to 15 percent slopes, moderately eroded	1, 310	. 3
Legore silt loam, 15 to 25 percent slopes, moderately eroded	770	. 2
Legore silt loam, 25 to 45 percent slopes	430	. 1
Legore very stony silt loam, 3 to 15 percent slopes	1, 650	. 4
Legore very stony silt loam, 15 to 25 percent slopes	1, 140	0. 3
Legore very stony silt loam, 25 to 45 percent slopes	1, 290	. 3
Legore silty clay loam, 8 to 15 percent slopes, severely eroded	750	. 2
Legore silty clay loam, 15 to 25 percent slopes, severely eroded	690	. 2
Legore-Urban land complex, 0 to 8 percent slopes	3, 260	. 8
Legore-Urban land complex, 8 to 15 percent slopes	1, 800	. 5
Lenoir loam, 0 to 5 percent slopes	940	. 2
Lenoir silt loam, 0 to 5 percent slopes	2, 140	. 5
Lenoir silt loam, 5 to 12 percent slopes, moderately eroded	270	. 1
Lenoir silty clay loam, 5 to 12 percent slopes, severely eroded	230	. 1
Lenoir-Urban land complex, 0 to 5 percent slopes	740	. 2
Leonardtown silt loam	560	. 1
Lindside silt loam	510	. 1
Loamy and clayey land, 0 to 5 percent slopes	3, 460	. 9
Loamy and clayey land, 5 to 15 percent slopes	6, 570	1. 7
Loamy and clayey land, 15 to 40 percent slopes	590	. 1
Made land	3, 600	. 9
Manor loam, 3 to 8 percent slopes, moderately eroded	8, 810	2. 3
Manor loam, 8 to 15 percent slopes, moderately eroded	20, 090	5. 2
Manor loam, 8 to 15 percent slopes, severely eroded	3, 360	. 9
Manor loam, 15 to 25 percent slopes, moderately eroded	8, 380	2. 1
Manor loam, 15 to 25 percent slopes, severely eroded	6, 830	1. 7
Manor channery loam, 3 to 8 percent slopes, moderately eroded	3, 140	. 8
Manor channery loam, 8 to 15 percent slopes, moderately eroded	12, 270	3. 1
Manor channery loam, 8 to 15 percent slopes, severely eroded	2, 010	. 5
Manor channery loam, 15 to 25 percent slopes, moderately eroded	11, 700	3. 0
Manor channery loam, 15 to 25 percent slopes, severely eroded	8, 300	2. 1
Manor soils, 25 to 50 percent slopes	16, 310	4. 2
Manor-Urban land complex, 15 to 25 percent slopes	350	. 1
Manor and Glenelg very stony loams, 3 to 15 percent slopes	570	. 1
Manor and Brandywine very stony loams, 15 to 25 percent slopes	1, 000	. 3
Manor and Brandywine very stony loams, 25 to 65 percent slopes	8, 000	2. 1
Matapeake silt loam, 0 to 2 percent slopes	240	. 1
Matapeake silt loam, 2 to 5 percent slopes	670	. 2
Matapeake silt loam, 5 to 12 percent slopes, moderately eroded	260	. 2
Mattapex silt loam, 0 to 2 percent slopes	1, 940	. 5
Mattapex silt loam, 2 to 5 percent slopes	3, 170	. 8
Mattapex-Urban land complex, 0 to 5 percent slopes	3, 740	1. 0
Melvin silt loam	330	. 1
Melvin silt loam, local alluvium	1, 210	. 3
Mine dumps and quarries	120	(1)
Montalto silt loam, 3 to 8 percent slopes, moderately eroded	1, 690	. 4
Montalto silt loam, 8 to 15 percent slopes, moderately eroded	390	. 1
Mt. Airy channery loam, 3 to 8 percent slopes, moderately eroded	380	. 1
Mt. Airy channery loam, 8 to 15 percent slopes, moderately eroded	1, 690	. 4

TABLE 1.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Acres	Percent	Soil	Acres	Percent
Mt. Airy channery loam, 15 to 25 percent slopes, moderately eroded	1,440	0.4	Sassafras sandy loam, 10 to 15 percent slopes, moderately eroded	310	0.1
Mt. Airy channery loam, 15 to 25 percent slopes, severely eroded	1,250	.3	Sassafras loam, 0 to 2 percent slopes	490	.1
Neshaminy silt loam, 3 to 8 percent slopes, moderately eroded	2,730	.7	Sassafras loam, 2 to 5 percent slopes	1,020	.3
Neshaminy silt loam, 8 to 15 percent slopes, moderately eroded	950	.2	Sassafras loam, 5 to 10 percent slopes, moderately eroded	350	.1
Othello silt loam	820	.2	Sassafras-Urban land complex, 0 to 5 percent slopes	5,170	1.3
Pocomoke sandy loam	110	(1)	Sassafras and Joppa soils, 5 to 15 percent slopes, severely eroded	640	.2
Relay silt loam, 8 to 15 percent slopes, moderately eroded	330	.1	Sassafras and Joppa soils, 15 to 30 percent slopes	420	.1
Relay silt loam, 15 to 25 percent slopes, moderately eroded	150	(1)	Stony land, steep	1,670	.4
Relay very stony silt loam, 3 to 25 percent slopes	230	.1	Sunnyside fine sandy loam, 0 to 5 percent slopes, moderately eroded	250	.1
Relay very stony silt loam, 25 to 65 percent slopes	640	.2	Swamp	180	(1)
Relay clay loam, 15 to 25 percent slopes, severely eroded	310	.1	Tidal marsh	2,320	.6
Sand and gravel pits	1,240	.3	Watchung silt loam, 0 to 3 percent slopes	750	.2
Sassafras sandy loam, 0 to 2 percent slopes	1,060	.3	Watchung silt loam, 3 to 8 percent slopes	700	.2
Sassafras sandy loam, 2 to 5 percent slopes	2,970	.8	Watchung very stony silt loam, 0 to 8 percent slopes	530	.1
Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded	610	.2	Woodstown sandy loam, 0 to 2 percent slopes	1,810	.5
Sassafras sandy loam, 5 to 10 percent slopes, severely eroded	210	.1	Woodstown sandy loam, 2 to 5 percent slopes	1,090	.3
			Woodstown loam, 0 to 2 percent slopes	910	.2
			Woodstown loam, 2 to 5 percent slopes	650	.2
			Paved areas	540	.1
			Total	390,400	100.0

[1] Less than 0.05 percent.

Aldino Series

The Aldino series consists of moderately well drained, nearly level to moderately sloping, very silty soils that are moderately deep to a fragipan. These soils are on uplands of the Piedmont Province. They formed in material weathered from serpentine rock. The native vegetation is mixed upland hardwoods, mainly oaks, and some Virginia pine.

In a representative profile the surface layer is silt loam about 6 inches thick. This layer is very dark grayish-brown in the thinner upper part and brown in the lower part. The upper part of the subsoil, about 11 inches thick, is yellowish-brown silty clay loam that is sticky and plastic. The lower part, about 20 inches thick, is a brownish-gray to greenish-gray, silty clay loam fragipan that has brown mottles. It is very fine, dense, brittle, and platy. Underlying the fragipan is loam that formed in material derived from serpentine rock. This material has streaked or banded colors. It extends to the depth of bedrock.

Aldino soils are fairly easy to work where moisture content is favorable and the soil is not too stony. Planting dates may be delayed, however, because these soils sometimes are wet and slow to warm in spring. In places artificial drainage is required for cultivation of crops. Permeability is slow in these soils, and available moisture capacity is moderate. In dry seasons these soils tend to dry out quickly. They have moderate to severe limitations for many nonfarm uses.

Representative profile of Aldino silt loam, 0 to 3 percent slopes, in a wooded area south of the intersection of Security Boulevard and Belmont Road:

A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; very friable, slightly sticky; many roots; very strongly acid; clear, wavy boundary.

A2—2 to 6 inches, brown (10YR 5/3) silt loam; weak, very fine, subangular blocky structure; friable, slightly sticky; many roots; very strongly acid; clear, wavy boundary.

B2t—6 to 17 inches, yellowish-brown (10YR 5/4) silty clay loam, variegated with strong brown (7.5YR 5/8); moderate, fine, subangular blocky structure; firm, sticky and plastic; common roots; faint, gray or light-gray (10YR 6/1) clay films; very strongly acid; gradual, wavy boundary.

Bx1—17 to 33 inches, light brownish-gray (10YR 6/2) silty clay loam; many, coarse, distinct mottles of strong brown (7.5YR 5/8); weak, coarse, subangular blocky and moderate, thin, platy structure; very firm, brittle, plastic and very sticky; few roots; prominent gray or light-gray (10YR 6/1) clay films; strongly acid, wavy boundary.

Bx2—33 to 37 inches, dark greenish-gray (5GY 4/1) silty clay loam; common, medium, prominent mottles of yellowish brown (10YR 5/8); weak, thin, platy structure; very firm, brittle, sticky and plastic; very few roots; faint, gray or light-gray (10YR 6/1) clay films; medium acid; gradual, wavy boundary.

C—37 to 60 inches, banded dark greenish-gray (5GY 4/1), olive-brown (2.5Y 4/4), and light yellowish-brown (2.5Y 6/4) loam; massive with inherent rock structure; friable; slightly sticky; slightly acid.

In the A horizon hue is 10YR or 2.5Y, value ranges from 3 to 5, and chroma from 1 to 3. The lowest values and chromas are limited to undisturbed A1 horizons less than 6 inches thick.

The Bt horizon is silty clay loam or heavy silt loam that is 25 to 30 percent clay. Hue in this horizon is 10YR or 2.5Y, value is 5 or 6, and chroma is 3 or 4.

The Bx horizon is silt loam or silty clay loam. Hue ranges from 10YR to 5Y, but ranges to 5GY in the lower part. Value in the matrix ranges from 4 to 6 and chroma from 1 to 4. Mottling ranges in hue from 2.5Y to 7.5YR, in value from 5 to 7, and in chroma from 4 to 8.

The C horizon is loam or silt loam. Color is wide in range and can be variegated, streaked, or banded.

The solum ranges from about 30 to 48 inches in thickness. Depth to bedrock ranges from 3½ feet to 6 feet. Some fine gravel is in the lower part of the solum and in the C horizon. In places stones are in various parts of the profile.

Aldino soils resemble Beltsville and Captina soils in color, in drainage, and by having a fragipan. They contain more silt and less sand than Beltsville soils. They are less strongly acid and shallower over bedrock than either Beltsville or Captina soils. Aldino soils are less acid and less micaceous than Glenville soils, and they are better aerated and less wet seasonally. They formed in the same general material as the well-drained Chrome soils.

Aldino silt loam, 0 to 3 percent slopes (AdA).—This soil has the profile described as representative of the series. In places some of the surface layer has been lost through erosion, and elsewhere there are local areas of surface soil accumulation.

In rainy periods, or when snow melts, this soil becomes saturated quickly, because water penetrates through the subsoil slowly and does not run off readily. The soil therefore remains wet for fairly long periods of time. Drainage is improved by shallow ditches or by tile lines. Bedding also helps to remove excess water from cropland, and graded rows improve surface drainage on slopes. In places diversion terraces are used to intercept water that might otherwise accumulate. Capability unit IIw–2; woodland subclass 3o.

Aldino silt loam, 3 to 8 percent slopes, moderately eroded (AdB2).—The profile of this soil is similar to the one described as representative of the series, except that in areas that have been cleared and farmed, much of the surface layer has been lost through erosion. In many places the subsoil has been turned up by plowing.

Included with this soil in mapping are some severely eroded areas where the subsoil is exposed and gullies cut the areas. Also included are some small areas that have a heavy clay subsoil.

In places the soil forms a surface crust after rain, and it becomes cloddy after cultivation. This soil is seasonally wet and is slow to warm in spring. The hazard of further erosion is the most serious limitation to farming, particularly if the soil is already wet when rains are heavy. Drainage improvement is needed in some cultivated areas. More important in most areas is the interception and disposal of seasonally excess surface water. This soil is suitable for pasture and for most crops, but alfalfa and other perennial crops are injured by frost heaving. Capability unit IIe–14; woodland subclass 3o.

Aldino silt loam, 8 to 15 percent slopes, moderately eroded (AdC2).—This soil generally has a thinner surface layer and is shallower to bedrock than more gently sloping Aldino soils, and there are stones or boulders in the subsoil. Where plowing turns up subsoil, clods and surface crusts form, and the hazard of further erosion is severe.

Included with this soil in mapping are scattered gullied areas where the subsoil is exposed. Also included are some small areas that have a heavy clay subsoil. Seepage areas or wet-weather springs are at the bases of some slopes.

The soil is limited for safe cultivation because of the hazard of further erosion. The main farm use is pasture. Capability unit IIIe–14; woodland subclass 3r.

Aldino very stony silt loam, 0 to 15 percent slopes (AsC).—This soil has a profile similar to that described as representative of the series, except that stones are on and near the surface. They are mostly of serpentine, larger than 10 inches in diameter, and 5 to 30 feet apart. In the subsoil and in the underlying layer these stones generally are larger and more abundant. There are outcrops of bedrock in places.

This soil is suited to trees and wildlife habitat. Cultivation is impractical unless some of the stones are removed. If the stones are removed, hay crops and pasture plants can be grown. Most areas are still in trees. Capability unit VIs–3; woodland subclass 3r.

Aldino-Urban land complex, 0 to 8 percent slopes (AuB).—This complex consists of nearly level to gently sloping soils of the Aldino series that have been cut, filled, graded, or otherwise disturbed for nonfarm uses. A few acres are very stony. This important mapping unit is mostly in the area west and northwest of the city of Baltimore.

About 30 percent of this complex is made up of relatively undisturbed Aldino soils. In about 50 percent of complex the soils have been covered by as much as 18 inches of fill material, or they have had as much as two-thirds of the original profile removed by cutting or grading. The remaining 20 percent of the area is Urban land, where the soil has been covered by fill material to a depth of more than 18 inches, or most of the profile or all of it has been cut away. The fill material generally is silty and is from adjacent areas that have been cut or graded. Streets and buildings make up a significant part of the complex.

Except where fill materials are deep, seasonal wetness and a high water table limit the suitability of this complex for building sites, septic tanks, and other residential and community uses. The soil materials and most fill materials are fairly well suited to lawn grasses, ornamental shrubs, and other plants. Suitability of soils in deeply filled or cut areas must be determined for each site. Capability unit and woodland subclass not assigned.

Alluvial Land

Alluvial land (Av) consists of soil material washed from uplands and deposited on flood plains. Such deposition has been especially rapid along streams that drain urban and suburban areas and discharge into tidal waters. The materials that make up Alluvial land are mostly sandy because much of the finer material has been carried into stream estuaries. Generally, this land is somewhat poorly drained to very poorly drained. Most of it is flooded at least twice a year. Where the watershed has been intensely developed and many roofs and much pavement are in the area, flooding is commonly even more frequent. Where the watershed is mostly in woods and pasture, flooding does not occur every year.

This land type is not cultivated. Most of it is in woodland or is idle. In places trees grow well enough to pro-

vide wood products, but valuable trees generally do not grow in the wetter and more frequently flooded areas. This land makes suitable habitat for some kinds of wildlife. It should be valuable for nature areas within a densely populated region. Capability unit VIw–1; woodland subclass 2w.

Baile Series

The Baile series consists of deep, poorly drained, nearly level to gently sloping, dominantly gray soils of the Piedmont Plateau. These soils formed partly in local alluvium and partly in material that weathered in place from micaceous rock. They are upland depressions, at the heads of drains, and on foot slopes adjacent to minor drainageways, many of which lack channels. The native vegetation is wetland hardwoods. Cleared idle areas generally are in sedges, grasses, and herbs (fig. 5).

In a representative profile the surface layer is silt loam about 13 inches thick. This layer is very dark grayish brown in the thinner upper part and is light brownish gray, mottled with other colors, in the thicker lower part. The subsoil, about 28 inches thick, is gray, mottled clay loam that is sticky and plastic. The underlying material is dark greenish-gray micaceous loam streaked with yellowish brown.

Figure 5.—Needlegrass and skunk cabbage on Baile silt loam, 0 to 3 percent slopes.

Baile soils have a high available moisture capacity and a water table that is seasonally at or near the surface. They are medium acid to very strongly acid. Permeability is slow. These soils generally are not cultivated, but where artificially drained they are suited to improved pasture. Baile soils have severe limitations for most nonfarm uses.

Representative profile of Baile silt loam, 3 to 8 percent slopes, in a wooded area one the west side of Pott Spring Road, about one-half mile south of Bosley Road:

A1—0 to 5 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, medium, granular structure; friable, slightly sticky; many roots; very strongly acid; clear, wavy boundary.

A2g—5 to 13 inches, light brownish-gray (2.5Y 6/2) silt loam; common, medium, distinct mottles of brown (10YR 5/3) and few, fine, prominent mottles of strong brown (7.5YR 5/8); weak, fine, granular structure; friable, slightly sticky; common roots; strongly acid; clear, wavy boundary.

B21tg—13 to 28 inches, gray (N 5/0) clay loam; many, medium and coarse, prominent mottles of strong brown (7.5YR 5/6); weak, medium, subangular blocky structure; friable to firm, sticky and plastic; common roots; gray (10YR 5/1) clay films; strongly acid; gradual, wavy boundary.

II22tg—28 to 41 inches, gray (N 5/0) clay loam; many, coarse, prominent mottles of yellowish brown (10YR 5/6); weak, coarse, subangular blocky structure; friable to firm, sticky and plastic; few roots; thin clay films; many mica flakes; some lenses of dark greenish gray (5GY 4/1); some fine quartzite gravel; medium to strongly acid; clear, wavy boundary.

IICg—41 to 60 inches, dark greenish-gray (5GY 4/1) loam; streaks of yellowish brown (10YR 5/6); massive; friable; highly micaceous; medium acid to strongly acid.

In the A and B horizons the hue is 10YR or yellower but in places color is neutral. In these horizons, the value ranges from 2 to 6 and the chroma from 0 to 2. Values of 2 or 3 are limited to A1 horizons that are less than 6 inches thick. Value of 5 or 6 are limited to the A2 horizon. In cultivated areas the plow layer is gray to dark gray.

In the B horizon color ranges in value from 4 to 6 and in chroma from 0 to 2. The mottles range in value from 4 to 6, in chroma from 4 to 8, and in hue from 10YR to 5YR. The B2t horizon is heavy silt loam, silty clay loam, or clay loam that is high in silt.

The C horizon, in places, is of the same color range as the B horizon, but it frequently is greener or bluer, has hues of 5GY, 5G, 5BG, or 5B, and is less prominently mottled. The C horizon contains less clay than the B horizon and is loam, silt loam, or sandy loam.

The solum generally formed in local alluvium over residuum, but in places it formed entirely in alluvium. The solum ranges from about 30 to 42 inches in thickness, and the depth to bedrock ranges from about 5 to 10 feet. In places stones or cobblestones of colluvial origin are on or near the surface.

Baile soils resemble Elkton, Fallsington, Leonardtown, Othello, and Watchung soils in color and drainage. They have a less clayey B horizon than Elkton and Watchung soils and a less sandy B horizon than Fallsington soils. Baile soils do not have a fragipan or hardpan in the lower part of the B horizon, but Leonardtown soils have such a pan. They are less silty and contain more mica than Othello soils. Baile soils are wetter than Glenville soils, although they are in similar positions and formed in the same kind of material.

Baile silt loam, 0 to 3 percent slopes (BaA).—The profile of this soil is similar to the one described as representative of the series.

Included with this soil in mapping are small areas of soils that are better drained than this soil, but some of these areas are subject to flooding. In places washed-in accumulations of silt are in low spots. Also included are small areas of soils that have been filled or otherwise disturbed as a result of suburban development.

The soil is not only difficult to drain but remains quite difficult to work after drainage. It is sticky when wet and becomes hard when dry. The soil seldom is used for cultivated crops, even though it does not readily deteriorate in use. Growing of permanent improved pasture or permanent hay generally are the most suitable uses. Many areas remain in trees. This soil provides good habitat for some kinds of wildlife. Capability unit Vw–1; woodland subclass 1w.

Baile silt loam, 3 to 8 percent slopes (BaB).—This soil has the profile described as representative of the series.

Included with this soil in mapping are some small areas of soils that are somewhat better drained, some accumulations of silt, some eroded places, and a few acres that have slopes slightly greater than 8 percent. Some small areas have been filled or otherwise disturbed.

The soil absorbs water very slowly and most rainfall and snowmelt tend to run off, creating a severe hazard of erosion where the soil has been cleared for use. Wetness and poor drainage, however, are the major limitations to soil use. Hay or improved pasture plants can be grown, but the soil generally is better suited to trees and wildlife habitat. Capability unit VIw–2; woodland subclass 1w.

Baltimore Series

The Baltimore series consists of deep, well-drained, nearly level to moderately sloping soils in valleys on the Piedmont Plateau. These soils formed in deposits of weathered micaceous colluvium over material weathered in place from marble or dolomite. The native vegetation probably was mixed upland hardwoods, but no undisturbed wooded areas remain.

In a representative profile the surface layer is dark reddish-brown silt loam about 10 inches thick. The subsoil is about 32 inches thick. The upper 5 inches is a thin layer of yellowish-red clay loam that contains a few rounded pebbles, and the lower 27 inches is red gravelly clay loam that is sticky and plastic. Rounded pebbles are visible to a depth of about 30 inches. Beneath the subsoil is strong-brown loam or silt loam that weathered from the underlying rock, which is at a depth of 6 feet or more.

Baltimore soils are fairly easy to work where moisture content is favorable. In spring they warm soon enough for all normal farming operations. The permeability is moderate. The available moisture capacity is high, as is the natural level of calcium and other mineral plant nutrients. These soils are used intensively for cultivated crops, hay, and improved pasture. Some areas have been converted to residential or other nonfarm uses.

Representative profile of Baltimore silt loam, 3 to 8 percent slopes, moderately eroded in a cultivated area on Padonia Road, 1,500 feet east of Route 45 at Texas:

Ap—0 to 10 inches, dark reddish-brown (5YR 3/3) silt loam; moderate, fine and medium, granular structure; friable, slightly sticky; many roots; a few rounded pebbles; neutral; abrupt, smooth boundary.

B1—10 to 15 inches, yellowish-red (5YR 4/6) clay loam; moderate, fine, subangular blocky structure; friable, sticky and slightly plastic; common roots; a few rounded pebbles; slightly acid; gradual, wavy boundary.

B21t—15 to 31 inches, red (2.5YR 4/6) gravelly clay loam; moderate, medium, subangular blocky structure; firm, sticky and plastic; few roots; continuous dark-red (2.5YR 3/6) clay films; some fine mica; about 20 percent rounded and subangular pebbles; neutral; gradual, wavy boundary.

B22t—31 to 42 inches, red (2.5YR 4/6 gravelly clay loam; weak, coarse, subangular blocky structure; very firm, plastic and slightly sticky; discontinuous clay films; some fine mica; about 15 percent rounded and subangular pebbles; reddish-black (10R 2/1) coatings on some pebbles; neutral; clear, wavy boundary.

IIC—42 to 72 inches, strong-brown (7.5YR 5/6) silt loam or loam; massive; firm, slightly sticky; black mineral grains evident throughout; slightly acid.

In the A horizon hue ranges from 5YR to 7.5YR, value is 2 or 3, and chroma ranges from 1 to 3. The chroma of 1 is limited to thin, undisturbed A1 horizons. The A horizon is silt loam that commonly borders on loam.

In the B horizon the hue is 2.5YR or 5YR, the value is 4 or 5, and the chroma is 6 or 8. The Bt horizon is clay loam or silty clay loam that is 27 to 35 percent clay.

The IIC horizon is less red and is coarser in texture than the B horizon, and in many profiles the IIC horizon is micaceous.

The solum ranges from 36 to 50 inches in thickness. Bedrock of marble or limestone is generally at a depth of 6 to 10 feet. Rounded to subangular pebbles of quartzite range to about 20 percent in the A and B horizons, and in places there are small cobblestones in the B horizon. Coarse fragments generally are not in the IIC horizon.

Baltimore silt loam, 0 to 3 percent slopes (BmA).—The profile of this soil is similar to the one described as representative of the series. Accumulations of silty material are in some depressions.

This soil is nearly level, and because it generally is well supplied with moisture and natural plant nutrients, it has practically no limitations for farm use. Under good management this soil will remain in excellent condition for continuous intensive use. Capability unit I–1; woodland subclass 1o.

Baltimore silt loam, 3 to 8 percent slopes, moderately eroded (BmB2).—This soil has the profile described as representative of the series. It is the most extensive of all soils in the county that have been strongly influenced by the natural lime content of the underlying material.

The hazard of further erosion is moderate, but otherwise the soil has no limitations for use in farming. The soil is well suited to cultivated crops, hay, pasture plants, and many kinds of trees. Included in mapping are some severely eroded areas that are gullied. Capability unit IIe–1; woodland subclass 1o.

Baltimore silt loam, 8 to 15 percent slopes, moderately eroded (BmC2).—The surface layer of this soil generally is thinner than that in the profile described as representative of the series, and the soil generally is less deep over bedrock.

Included with this soil in mapping are some areas where the silty surface layer is almost entirely gone, is gullied, or both. Also included are a few acres that have slope of more than 15 percent.

Rainwater or snowmelt runs off of these slopes so rapidly, unless checked, that the hazard of further erosion is severe. Intensive good management, including erosion-control measures, is necessary to keep the soil in condition for continued farming. Capability unit IIIe–1; woodland subclass 1o.

Baltimore-Urban land complex, 0 to 8 percent slopes (BnB).—This complex consists of level to gently sloping soils of the Baltimore series that have been cut, filled, graded, or otherwise disturbed for nonfarm uses. This complex generally is in areas where suburban development has expanded into parts of fertile limestone valleys.

In about 40 percent of the area of this complex the soils are relatively undisturbed. In about 50 percent of the complex the soils have been covered by as much as 18 inches of borrow material or other fill, or they have had as much as two-thirds of the original profile removed by cutting or grading. The remaining 10 percent of the area is Urban land. Where the soils have been covered by 18 inches or more of fill material, most or all of the soil material has been removed by cutting or grading. The fill material is variable, but it generally is from adjacent areas of Baltimore soils that have been cut or graded.

Internal drainage is good on this complex, except where manmade projects have modified it. The areas generally are good for foundations and footings, and they are satisfactory for basements or other excavations. The soil materials and most fill materials generally are well suited to growing ornamental shrubs or other vegetation. Pavement and buildings of various kinds make up part of the complex. Suitability of soil materials in deeply filled or cut areas must be determined for each site. Capability unit and woodland subclass not assigned.

Barclay Series

The Barclay series consists of deep, somewhat poorly drained, nearly level silt loams. These soils are in the southeastern, or Coastal Plain, part of the county. The native vegetation consists of hardwoods that tolerate wetness, principally red maple, sweetgum, holly, and certain oaks.

In a representative profile the surface layer is brown or dark-brown silt loam about 12 inches thick. The upper 13 inches of the subsoil is yellowish-brown silt loam faintly mottled with grayish brown. The lower 19 inches of the subsoil is gray or light-gray silt prominently mottled with yellowish red and yellowish brown. The underlying material is mottled brown massive silt loam.

Barclay soils are fairly easy to work where moisture content is favorable, but they commonly are wet for fairly long periods. Permeability is moderate, and water moves fairly readily through the surface layer and subsoil. The water table generally is fairly close to the surface, and in places it is at the surface for short periods. Available moisture capacity is high. Artificial drainage is needed for most common crops. Barclay soils have moderate to severe limitations for many nonfarm uses.

Representative profile of Barclay silt loam, in a nearly level wooded area at the intersection of Rocky Point Road and Barrison Point Road:

A1—0 to 1 inch, dark-brown (10YR 3/3) silt loam; moderate, fine, granular structure; very friable, slightly sticky; many roots; extremely acid; clear, irregular boundary.

A2—1 to 12 inches, brown (10YR 5/3) silt loam; few, medium, faint, light brownish-gray (10YR 6/2) mottles; weak, very fine, subangular blocky structure; friable, slightly sticky; common to many roots; very strongly acid; gradual, wavy boundary.

B2—12 to 25 inches, yellowish-brown (10YR 5/4) silt loam; many, medium, faint grayish-brown (10YR 5/2) mottles; weak, fine, subangular blocky structure; firm, slightly sticky; common roots; very strongly acid; gradual, wavy boundary.

B3g—25 to 44 inches, gray or light-gray (10YR 6/1) silt; many, medium, prominent, yellowish-brown (10YR 5/6) and yellowish-red (5YR 4/8) mottles; very weak, coarse, blocky structure; loose to very friable; few roots; very strongly acid; gradual, wavy boundary.

C—44 to 60 inches, brown (10YR 5/3) silt loam; many, medium, distinct yellowish-brown (10YR 5/8) mottles; massive; firm; very high in fine sand; very strongly acid.

In the A horizon, value ranges from 3 to 6 and chroma is 1 to 3. The value of 3 is limited to undisturbed A1 horizons less than 6 inches thick.

In the B horizon value is 5 or 6. Chroma is 3 or 4 in the B2 horizon and 1 or 2 in the B3g horizon. Mottles in the B horizon dominantly have a chroma of 2 or less, but some mottles have higher chromas.

The C horizon generally is silt loam but is loam or fine sandy loam in some places. It is more variable in color than the solum. In places the Cg horizon has matrix chroma of 2 or less.

The thickness of the solum ranges from 36 to 60 inches. Matrix hue throughout the profile is 10YR or 2.5Y.

Barclay soils resemble Codorus and Iuka soils, but they are more silty throughout the solum and are not on flood plains.

The annual temperature of the Barclay soils in Baltimore County is a few degrees cooler than the range defined for the series, but this difference does not alter their usefulness and behavior.

Barclay silt loam (Br).—This is the only Barclay soil mapped in the county. It is mostly nearly level, but in a few small areas it has a slope of slightly more than 2 percent.

Included with this soil in mapping are small areas where drainage is slightly better than that of this soil. Also included are areas where the soil has a less silty and more clayey subsoil than this soil. Some other small areas have been filled or otherwise modified.

If this soil is artificially drained, it is suited to cultivated crops and improved pastures. Most undrained areas are wooded. Capability unit IIIw–1; woodland subclass 2w.

Beltsville Series

The Beltsville series consists of deep, moderately well drained, nearly level to moderately sloping, very strongly acid to extremely acid soils. They have a fragipan, generally at a depth of less than 30 inches. These soils formed in loamy and sandy material deposited over very old sandy or gravelly deposits on uplands of the Coastal Plain. The native vegetation is largely scrub oaks, other hardwoods, and some Virginia pine.

In a representative profile the surface layer is pale-brown silt loam about 10 inches thick. In wooded areas the upper part of the surface layer is black or nearly

black. The upper part of the subsoil, about 18 inches thick, is yellowish-brown, firm silt loam that is partly variegated with other colors. The lower part of the subsoil is the fragipan and is about 15 inches thick. It is yellowish-brown mottled silty clay loam that is very firm, dense, and brittle when moist and very hard when dry. Water moves slowly through this fragipan, and roots do not penetrate it readily. Underlying the fragipan is older, coarser material that is more permeable than is the fragipan.

Beltsville soils are often saturated near the surface, and at the same time they are almost dry in the fragipan and below it. They have moderate available moisture capacity. Some of these soils are cultivated, but most are in a part of the county where rapid residential and industrial development is taking place. Beltsville soils have moderate to severe limitations for many nonfarm uses.

Representative profile of Beltsville silt loam, 2 to 5 percent slopes, in a wooded area on Silver Spring Road, about three-fourths mile west of Philadelphia Road:

A1—0 to 1 inch, black (10YR 2/1) silt loam; weak, fine, granular structure; very friable; many roots; extremely acid; clear, smooth boundary.

A2—1 to 10 inches, pale-brown (10YR 6/3) silt loam; weak, medium, granular and fine, subangular blocky structure; friable, slightly sticky; roots common; very strongly acid; gradual, wavy boundary.

B1—10 to 18 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, subangular blocky structure; firm; slightly sticky; common roots; very strongly acid; gradual, wavy boundary.

B2t—18 to 28 inches, yellowish-brown (10YR 5/4) heavy silt loam, variegated with pale brown (10YR 6/3) and yellowish brown (10YR 5/8); weak to moderate, medium, subangular blocky structure; firm, slightly sticky and slightly plastic; few roots; distinct brown (7.5YR 5/4) clay films; very strongly acid; gradual, wavy boundary.

Bx—28 to 43 inches, yellowish-brown (10YR 5/4) light silty clay loam; common, medium and coarse, distinct mottles of yellowish brown (10YR 5/8) and many, coarse, faint mottles of pale brown (10YR 6/3); weak, very coarse, prismatic and thick platy structure; very firm, sticky and slightly plastic; a few roots between prisms in upper part; discontinous brown (7.5YR 5/4) clay flows; many fine and medium pores; very strongly acid; gradual, wavy boundary.

IIC—43 to 60 inches, yellowish-brown (10YR 5/6) loam; massive; firm, slightly sticky and slightly plastic; some thin fragments of ferruginous sandstone (ironstone); very strongly acid.

The A horizon is 2.5Y or 10YR in hue, 2 to 7 in value, and 1 to 6 in chroma. Values of 3 and chromas of 1 and 2 are limited to very thin A1 horizons. Values of 6 or 7 and chromas of 6 are limited to the A2 horizon.

In the B1 and Bt horizons hue is 10YR, and value is 5 or 6. Chroma ranges from 4 to 6 and is variegated in places. These horizons are silt loam or silty clay loam and are more than 15 percent sand. The Bt horizon is 18 to 30 percent clay. Hue in the Bx horizon is 2.5Y, 10YR, or 7.5YR; value ranges from 4 to 6; and chroma ranges from 3 to 6. In places the Bx horizon is loam, silt loam, silty clay loam, or clay loam. It is characteristically very dense, hard, and brittle. The IIC horizon has about the same color range as the Bx horizon but is distinctly coarser in texture. Fine smooth pebbles are in places throughout the profile. Medium smooth pebbles are common to many in the IIC horizon.

The solum ranges from 40 to 64 inches in thickness. Depth to the Bx horizon ranges from 20 to 32 inches.

Beltsville soils are similar to Aldino and Captina soils in color and drainage, and like these soils they have a fragipan. They contain less silt and more sand and fine gravel than Aldino or Captina soils, and they are deeper to bedrock. They are not so well supplied with bases as Aldino soils. Beltsville soils are not so wet, gray, and poorly drained as Leonardtown soils, which frequently are in the same areas of the landscape.

Beltsville silt loam, 0 to 2 percent slopes (BtA).—The profile of this soil is similar to the one described as representative of the series. This soil becomes saturated quickly when it rains or when snow melts, and it generally remains wet for fairly long periods because runoff and permeability are slow. Planting dates frequently are late because of this wetness. Artificial drainage benefits most crops and improves the soil for many other uses. The hazard of erosion is slight. Capability unit IIw–8; woodland subclass 3w.

Beltsville silt loam, 2 to 5 percent slopes (BtB).—This soil has the profile described as representative of the series. In most cleared areas there has been some loss of surface soil because of erosion, but only in a few spots that are cut by a few shallow gullies has this loss been significant.

Water runs off readily, especially when the soil is wet, and there is always a hazard of erosion. The hazard of erosion is a more serious limitation to use than is impeded drainage, though drainage is needed for some uses. Capability unit IIe–13; woodland subclass 3w.

Beltsville silt loam, 5 to 10 percent slopes, moderately eroded (BtC2).—This soil generally has a thinner surface layer and subsoil than Beltsville soils that have lesser slopes, and erosion is more extensive. Plowing to usual depth generally turns up some subsoil, which makes newly plowed areas appear spotty.

Included with this soil in mapping are small areas that have a moderate amount of fine, smooth pebbles in the surface layer. A few acres have slopes of more than 10 percent.

The hazard of further erosion is severe, but the soil is suited to cultivated crops under intensive good management that includes erosion-control measures. The soil is also suited to pasture or trees. Capability unit IIIe–13; woodland subclass 3w.

Beltsville-Urban land complex, 0 to 5 percent slopes (BuB).—This complex consists of soils of the Beltsville series, half of which have been cut, filled, graded, or otherwise disturbed for nonfarm uses. These soils are in the southeastern part of the county in areas where residential and industrial development has been expanding.

About 50 percent of any area in this complex consists of relatively undisturbed Beltsville soils. These soils have a surface layer of loam or silt loam and in places are gravelly. In about 40 percent of the area the soils have been covered by as much as 18 inches of fill material or about two-thirds of the original soil has been removed by grading or cutting. The remaining 10 percent is Urban land where the soil has either been covered by more than 18 inches of fill material or has been mostly or entirely cut away. The fill material is variable, but generally it is from adjacent areas of Beltsville soils that have been cut or graded. Streets and buildings are in parts of this complex.

Except where porous fill materials are very thick and deep, seasonal wetness and a high water table limit the use of this complex for building sites, septic tanks, and other residential and community uses. The soils, and

generally the fill materials, are fairly suited to lawn grasses, ornamental shrubs, and other plants. Suitability of the soils in deeply filled or cut areas must be determined for each site. Capability unit and woodland subclass not assigned.

Beltsville-Urban land complex, 5 to 10 percent slopes (BuC).—This complex consists of soils of the Beltsville series, most of which have been graded, cut, filled, or otherwise disturbed for nonfarm uses.

About 30 percent of the area of this complex is made up of relatively undisturbed Beltsville soils. In about 50 to 55 percent of the area, the soils have been covered by as much as 18 inches of fill material, or they have had as much as two-thirds of the original soil removed by cutting or grading. The remaining 15 to 20 percent of the area is Urban land where the soil has been covered by fill material to a depth of more than 18 inches, or all or most of the soil has been cut away. The fill material is generally of local origin. Buildings and streets make up part of the complex.

Seasonal wetness and slope moderately to severely limit the use of this complex for building sites, septic tanks, and other nonfarm uses. In places filled areas are less stable and are less suitable for foundations than less disturbed areas. The soils and fill material, especially the cut or graded areas, are poorly to fairly suited to lawn grasses, shrubs, trees, and other plants. Suitability of the soils in deeply filled or cut areas must be especially determined for each site. Capability unit and woodland subclass not assigned.

Brandywine Series

The Brandywine series consists of deep, somewhat excessively drained to excessively drained, gently sloping to very steep soils on uplands of the Piedmont Plateau. Most of these soils are in the northern part of the county, but some are on heights above the Patapsco River. These soils formed in material weathered in place from gneiss. The native vegetation is oaks and other hardwoods and Virginia pine.

In a representative profile the surface layer is loam about 8 inches thick. This layer is very dark grayish brown in the thin upper part and yellowish brown in the lower part. The subsoil, about 12 inches thick, is yellowish-brown, friable gravelly loam. The underlying material is mostly angular fine gravel and coarse sand that generally is loose. Bedrock of hard gneiss is at a depth of about 6 feet. Some of the Brandywine soils are stony.

Brandywine soils are very strongly acid to extremely acid, have low available moisture capacity, and generally are not highly productive. They have moderately rapid permeability. Many areas, particularly those that are very stony, are still under a cover of trees. Slope and stoniness are moderate to severe limitations for nonfarm uses.

Representative profile of Brandywine loam, 8 to 15 percent slopes, moderately eroded, in a wooded area on the west side of Duncan Hill Road, about 1¾ miles northeast of Butler:

A11—0 to 1 inch, very dark grayish-brown (10YR 3/2) loam; weak, fine, granular structure; very friable; many roots; extremely acid; clear, wavy boundary.

A12—1 to 8 inches, yellowish-brown (10YR 5/4) loam; weak, fine, subangular blocky structure; large percentage of angular coarse sand; very friable; many roots; very strongly acid; clear, wavy boundary.

B2—8 to 20 inches, yellowish-brown (10YR 5/6) gravelly loam; weak, medium, subangular blocky structure; friable, slightly sticky; common roots; about 40 percent angular quartzite fine gravel; mica evident; very strongly acid; abrupt, wavy boundary.

C—20 to 72 inches, yellow (10YR 7/6) gravelly loamy coarse sand; single grain; loose; few roots; about 75 percent angular quartzite fine gravel and coarse sand; many mica flakes, oriented in streaks; very strongly acid; abrupt, wavy to irregular boundary.

R—72 inches, hard gneiss, somewhat shattered at boundary.

In all horizons, the hue is either 10YR or 7.5YR. The A horizon ranges from 3 to 5 in value and from 1 to 4 in chroma. The value of 3 is limited to the very thin A1 horizon. Texture is loam that is gritty and borders on gravelly loam.

The B horizon has a value of 5 or 6 and a chroma of 4 or 6. In places the B horizon is so weakly expressed that it is difficult to observe and define. It is moderately to highly gravelly.

The C horizon can be of uniform color or highly variegated. It is always highly gravelly, and in places it is very stony to bouldery.

The solum ranges from about 12 to 30 inches in thickness. Depth to solid bedrock ranges from 4 to 7 feet. Most of the rock fragments are fine or medium gravel, but in places many angular stones are present.

Brandywine soils are deeper to bedrock than Mt. Airy soils, which contain numerous thin flat fragments of mica schist. They contain more coarse fragments than the highly micaceous Manor soils. The Brandywine soils are similar to the Edgemont soils in color and drainage, but contain more coarse fragments and have a gravelly loam B horizon in contrast to the sandy clay loam B horizon of the Edgemont soils.

Brandywine loam, 3 to 8 percent slopes, moderately eroded (BwB2).—This soil has a profile similar to that described as representative of the series, except that in some places the surface layer, the subsoil, or both are thicker. In most areas this soil has lost part of its original surface layer through erosion.

Included with this soil in mapping are a few scattered spots that are severely eroded, some small areas that are nearly level, and some that are gravelly. The gravel is usually hard quartzite.

The soil tends to be droughty, but the hazard of further erosion generally is a more serious limitation to farming use than is droughtiness. Capability unit IIe–10; woodland subclass 3f.

Brandywine loam, 8 to 15 percent slopes, moderately eroded (BwC2).—This soil has the profile described as representative of the series. In most areas part of the original surface layer has been lost through erosion. Included in mapping are small areas where the soil is severely eroded and places where the surface layer contains hard quartzite gravel.

The soil tends to be droughty, but the severe hazard of further erosion is a much more serious limitation to farming than is droughtiness. Capability unit IIIe 10; woodland subclass 3f.

Brandywine gravelly loam, 15 to 25 percent slopes, moderately eroded (BvD2).—This moderately steep soil has a surface layer and subsoil that are thinner than those in the profile described as representative of the series. The surface layer contains 20 to 30 percent hard angular gravel in most places.

The soil is suited to pasture and trees but is marginal for cultivated crops. The hazard of further erosion is

severe. If especially intensive and careful erosion-control measures are used, it is safe to grow a cultivated crop occasionally. Capability unit IVe–10; woodland subclass 3f.

Brandywine gravelly loam, 15 to 25 percent slopes, severely eroded (ByD3).—Erosion has removed all of the original surface layer of this soil in most places, and shallow to deep gullies commonly cut the areas. Included in mapping are many areas where a layer of angular gravel is on the surface, and many accumulations of gravel are in the gullies.

The soil generally is not suited to cultivated crops, but appropriate conservation measures make it suitable for pasture or trees. Capability unit VIe–3; woodland subclass 3f.

Brandywine gravelly loam, 25 to 45 percent slopes (ByE).—This soil is mostly uneroded because it has remained under a protective cover of trees. The few small areas that have been cleared are moderately to severely eroded.

The soil is not suited to cultivated crops, and it can be used for pasture only under very careful protective management. The carrying capacity of pasture is low. Generally, more suitable uses are trees, wildlife habitat, and outdoor recreation. Capability unit VIe–3; woodland subclass 3f.

Captina Series

The Captina series consists of moderately well drained, deep, nearly level to gently sloping, acid silt loams. They have a fragipan at a depth of 20 to 30 inches. These soils formed in old silt alluvium underlain by older, coarser sediment. They are on terraces of streams in limestone valleys in the central part of the county. The native vegetation is mixed hardwoods, but most areas have been cleared.

In a representative profile the surface layer is brown or dark-brown silt loam about 9 inches thick. The upper part of the subsoil, about 12 inches thick, is dark yellowish-brown silty clay loam that is sticky and plastic. The lower part of the subsoil is the fragipan and is about 23 inches thick. It consists of mottled dark yellowish-brown silt loam that is firm to very firm and is brittle when moist and hard when dry. Water moves slowly through this fragipan, and roots do not penetrate it readily. Underlying the fragipan is dark yellowish-brown and strong-brown loam that crumbles readily and is more easily penetrated by roots and water.

Captina soils are often saturated near the surface and, at the same time, are almost dry in the fragipan and below it. They have a moderate to low available moisture capacity. Most of these soils are farmed. They are used mainly for forage crops and pasture. Captina soils have moderate to severe limitations for many nonfarm uses.

Representative profile of Captina silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated area about one-fourth mile north of Texas:

Ap—0 to 9 inches, brown or dark-brown (10YR 4/3) silt loam; moderate, fine, granular structure; very friable; many roots; slightly acid (limed); abrupt, smooth boundary.

B2t—9 to 21 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm, sticky and plastic; common roots; faint, discontinuous clay films; neutral; gradual, wavy boundary.

Bx1—21 to 28 inches, dark yellowish-brown (10YR 4/4) heavy silt loam; common, coarse, distinct mottles of grayish brown (10YR 5/2) and strong brown (7.5YR 5/8); moderate, thin, platy structure; firm, brittle, slightly sticky and slightly plastic; few roots; distinct clay films; slightly acid; gradual, wavy boundary.

Bx2—28 to 44 inches, dark yellowish-brown (10YR 4/4) silt loam; few, medium, distinct mottles of grayish brown (10YR 5/2); weak, thin, platy structure; very firm; slightly sticky; faint clay films; many rounded and subangular quartz pebbles; strongly acid; clear, smooth boundary.

IIC—44 to 60 inches, streaked dark yellowish-brown (10YR 3/4) and strong-brown (7.5YR 5/6) loam; stratified; very friable; strongly acid.

Hue throughout the profile generally is 10YR, but it is 7.5YR in some horizons and in some mottles. In the A horizon value ranges from 3 to 5 and chroma from 1 to 3. The value of 3 is limited to undisturbed Al horizons less than 6 inches thick.

In the Bt and Bx horizons matrix value is 4 or 5, and matrix chroma is 4 or 6. Mottles that have a chroma of 2 or less are always in the Bx horizon but are not always in the Bt horizon. These horizons are silt loam or silty clay loam.

The IIC horizon is variable in color and texture. It is coarser in texture than the A and B horizons, and in many areas it is gravelly.

The solum ranges from about 36 to 46 inches in thickness. Depth to bedrock is 6 to 20 feet or more. Captina soils characteristically have little sand and few or no coarse fragments in the solum.

Captina soils are similar to Aldino and Beltsville soils in color and drainage, and like those soils they have a fragipan. They contain more silt and less sand than Beltsville soils, and they are more strongly acid and deeper to bedrock than Aldino soils. Captina soils are less micaceous, deeper to bedrock, somewhat better aerated, and less wet seasonally than Glenville soils.

Captina silt loam, 0 to 3 percent slopes (CaA). This soil has a profile similar to that described as representative of the series. A small acreage of this soil has been filled or otherwise disturbed. In places accumulations of silt are in small depressions.

The chief limitations are seasonal wetness and impeded internal drainage. Artificial drainage is needed for most crops. Alfalfa and other perennial crops are damaged by frost-heaving. Erosion is not a serious hazard. Capability unit IIw–1; woodland subclass 3w.

Captina silt loam, 3 to 8 percent slopes, moderately eroded (CaB2).—This soil has the profile described as representative of the series. Part of the original surface layer has been lost through erosion. The brown to dark-brown color of the plow layer results from turning up and mixing of a small amount of the subsoil into the remaining surface layer material.

This soil is suited to cultivated crops, pasture, and trees. The hazard of further erosion is the most serious limitation to use, but drainage is needed in places for some crops. Perennial herbaceous crops are damaged by frost heaving. Capability unit IIe–16; woodland subclass 3w.

Chester Series

The Chester series consists of deep, well-drained, nearly level to moderately sloping soils on uplands of the Piedmont Plateau. These soils are mostly on broad

ridgetops and adjacent upper parts of hillsides. They formed in deep material that weathered in place from acid crystalline rocks, most commonly mica schist or other rocks containing much mica. The native vegetation is mixed upland oaks and other hardwoods.

In a representative profile the surface layer is brown or dark-brown silt loam about 11 inches thick. The upper part of the subsoil, about 22 inches thick, is dark yellowish-brown heavy silt loam that crumbles readily but is slightly sticky. The lower part of the subsoil, about 11 inches thick, is strong-brown silt loam. The underlying material is dark yellowish-brown and olive sandy loam derived from decayed rock that is micaceous and shows the original rock structure.

Chester soils are naturally strongly acid. They are fairly easy to work and have a high available moisture capacity. They are moderately permeable. These soils have few limitations for farm or other uses, except those that are imposed by slope and erosion.

Representative profile of Chester silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated area on Monkton-Manor Road, about two miles southeast of Monkton:

Ap—0 to 11 inches, brown or dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; many roots; slightly acid; abrupt, smooth boundary.

B21t—11 to 20 inches, dark yellowish-brown (10YR 4/4) heavy silt loam; weak, medium, subangular blocky structure; friable, slightly sticky; common roots; thin, discontinuous clay films; strongly acid; clear, smooth boundary.

B22t—20 to 33 inches, dark yellowish-brown (10YR 4/4) heavy silt loam; moderate, medium, subangular blocky structure; friable to firm, slightly sticky and slightly plastic; few roots; continuous clay films; strongly acid; clear, smooth boundary.

B3—33 to 44 inches, strong-brown (7.5YR 5/6) silt loam; weak, medium, subangular blocky structure; friable, slightly sticky; faint, brown or dark-brown (7.5YR 4/4) clay films; strongly acid; clear, wavy boundary.

C—44 to 55 inches, banded dark yellowish-brown (10YR 4/4) and olive (5YR 4/4) sandy loam saprolite that shows inherent rock structure; friable; micaceous; very strongly acid.

The A horizon ranges from 10YR to 7.5YR in hue, from 3 to 5 in value, and from 1 to 4 in chroma. The value of 3 and chroma of 1 are limited to undisturbed Al horizons less than 6 inches thick.

In the B horizon the hue ranges from 10YR to 5YR and ranges to 2.5YR in the extreme lower part. The value is 4 or 5, and the chroma ranges from 4 to 8. The B horizon is heavy loam, silt loam, clay loam, or silty clay loam, and it is 18 to 30 percent clay.

The C horizon is saprolite that generally is banded or variegated in two or more colors. It is micaceous and ranges from sandy loam to heavy loam in texture.

The solum ranges from 36 to 50 inches in thickness. Depth to bedrock ranges from 5 to 10 feet. Hard angular quartzite gravel, flat fragments of schist, or both are in any part of the profile.

Chester soils resemble Elsinboro, Glenelg, and Sassafras soils. They are not so stratified as the Elsinboro soils. They have a thinner solum and are less micaceous than Glenelg soils. They are shallower to bedrock and more micaceous than Sassafras soils. Chester soils are more strongly acid and contain less lime and natural nutrients than Conestoga soils.

Chester silt loam, 0 to 3 percent slopes (CcA).—The profile of this soil is similar to the one described as representative of the series, except that the surface layer is thicker and is grayish brown. Only a few areas have lost soil material through erosion. The silty material that has been lost has accumulated in slight depressions or around the stems of vegetation.

This soil is well suited to most uses and has very few, if any, limitations. Capability unit I–4; woodland subclass 2o.

Chester silt loam, 3 to 8 percent slopes, moderately eroded (CcB2).—This soil has the profile described as representative of the series. The surface layer is brown or dark brown because it has been mixed with material from the subsoil. Included in mapping are some small, widely scattered, severely eroded spots, and some areas of silt accumulation.

The hazard of further erosion is moderate on this soil, and the soil is well suited to nearly all uses. Capability unit IIe–4; woodland subclass 2o.

Chester silt loam, 8 to 15 percent slopes, moderately eroded (CcC2).—The surface layer of this soil is thinner than that in the profile described as representative of the series. Newly plowed areas appear spotty because of differences in the amount of subsoil that has been mixed into the surface layer. A few shallow gullies cut the areas.

The hazard of further erosion in cultivated areas is severe, but intensive good management that includes erosion control will maintain the soil in condition for continuous farming. Slope and hazard of further erosion are the chief limiting factors affecting nonfarm uses. Capability unit IIIe–4; woodland subclass 2o.

Chester gravelly silt loam, 3 to 8 percent slopes, moderately eroded (CgB2).—The profile of this soil is similar to that described as representative of the series except that the surface layer and the subsoil contain many small rock fragments. These are both angular fragments of hard white quartzite gravel and flattened fragments of mica schist and related rocks. These fragments, especially the hard gravel, are very abrasive and sometimes cause serious damage to cultivating equipment and other farm machinery. They also make the soil more difficult to work and manage than Chester silt loam that has few, if any, hard fragments. This soil is well suited, however, to nearly all uses, and the hazard of further erosion is only moderate. Capability unit IIe–4; woodland subclass 2o.

Chester gravelly silt loam, 8 to 15 percent slopes, moderately eroded (CgC2).—Rock fragments on the surface of this soil are concentrated in furrows and rills and in the few shallow gullies that are present. These fragments also accumulate on the lower part of slopes.

The hazard of further erosion is fairly severe. Intensive erosion control and other good management measures make the soil suited to many crops as well as to pasture and trees. The coarse fragments, slope, and the hazard of further erosion are factors that limit some nonfarm uses. Capability unit IIIe–4; woodland subclass 2o.

Chillum Series

The Chillum series consists of deep, well-drained, nearly level to moderately sloping soils on the uplands of the Coastal Plain. These soils are mostly on ridgetops and on the upper part of hillsides in areas where there are many drainageways. They formed in silty deposits over much older deposits of gravelly material that is

dense and compact, very firm when moist, and very hard when dry. The native vegetation is oaks and other hardwoods, Virginia pine, and a ground cover of shrubs that are adapted to acid soil.

In a representative profile the surface layer is dark grayish-brown silt loam about 6 inches thick. The subsoil, about 27 inches thick, is yellowish-brown silt loam that is firm and slightly sticky. The underlying material is massive, very firm and very hard gravelly loam.

Chillum soils are very strongly acid to extremely acid. They are moderately permeable in the surface layer and subsoil. They have high available moisture capacity. Use is limited by slope and hazard of erosion, and it is limited for some purposes by the hard, compact underlying material. These soils are mostly in a part of the county where residential development and other nonfarm uses are expanding.

Representative profile of Chillum silt loam, 2 to 5 percent slopes, moderately eroded, in a wooded but once-cultivated area on Forge Road, about 1.8 miles east of U.S. Highway 1, at Perry Hall:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium, granular structure; very friable; many roots; very strongly acid; clear, wavy boundary.

B21t—6 to 23 inches, yellowish-brown (10YR 5/6) heavy silt loam; weak, fine to medium, subangular blocky structure; firm, slightly sticky; common roots; discontinuous clay films; very strongly acid; gradual, wavy boundary.

B22t—23 to 33 inches, yellowish-brown (10YR 5/6) silt loam; weak, coarse, subangular blocky structure; firm, slightly sticky; few roots; discontinuous dark-brown (7.5YR 4/4) clay films; very strongly acid; gradual, wavy boundary.

IIC—33 to 50 inches, yellowish-red (5YR 4/8) gravelly loam; massive; very hard, very firm, slightly sticky; about 20 percent smooth gravel and a few cobblestones; very strongly acid.

Hue in the solum is either 10YR or 7.5YR. In the A horizon value ranges from 3 to 5 and chroma from 2 to 4. The value of 3 is restricted to undisturbed A1 horizons less than 6 inches thick.

In the B horizon the value is 4 or 5 and the chroma 4 or 6. Texture of the Bt horizon is either silt loam or silty clay loam.

The IIC horizon is variable in color. It commonly is redder than the solum, is variegated, or both. The IIC horizon generally is quite gravelly and characteristically is hard and firm.

The solum generally ranges from about 24 to 30 inches in thickness in most of the county, but it is thicker than 30 inches in places. Few if any pebbles are in the solum, but they are common in the IIC horizon.

Chillum soils are similar to Matapeake and Sassafras soils in color and in drainage. They have a hard, firm C horizon, but Matapeake soils have a more friable C horizon that is sandy and not highly gravelly. Chillum soils contain much more silt and less sand in the solum than Sassafras soils, which in places are redder than Chillum soils. Chillum soils have a solum that formed in the same kind of silty material as the Matapeake soils, the moderately well drained Beltsville and Mattapex soils, the somewhat poorly drained Barclay soils, and the poorly drained Leonardtown and Othello soils.

Chillum silt loam, 2 to 5 percent slopes, moderately eroded (ChB2).—This soil has the profile described as representative of the series. The surface layer is thin because of soil loss through erosion.

Included with this soil in mapping are a few acres where fine smooth pebbles are in the surface layer. Also included are a few nearly level areas and a few severely eroded spots.

The soil is suited to cultivated crops, pasture, and trees. The principal limitation to use is the moderate depth to the hard, gravelly substratum, which restricts deep root development. The hazard of further erosion is moderate. Capability unit IIs–7; woodland subclass 3o.

Chillum silt loam, 5 to 10 percent slopes, moderately eroded (ChC2).—The profile of this soil is similar to that described as representative of the series.

Included with this soil in mapping are a few areas where fine smooth pebbles are in the surface layer. Also included are small scattered areas where slope is slightly more than 10 percent.

The hazard of further erosion is more important in management than is the root-limiting hard substratum. Capability unit IIIe–7; woodland subclass 3o.

Chillum silt loam, 5 to 10 percent slopes, severely eroded (ChC3).—All or practically all of the original surface layer of this soil has been lost through erosion, and some areas are cut by small and large gullies. Included in mapping are a few pebbly areas and some scattered small areas that have slopes slightly greater than 10 percent.

The combination of slope and hazard of further erosion make the soil marginal for cultivation. The soil is suited to pasture and trees, and to an occasional cultivated crop if intensive erosion-control measures are used. Capability unit IVe 7; woodland subclass 3o.

Chillum-Neshaminy silt loams, 2 to 5 percent slopes, moderately eroded (CkB2).—About 75 percent of the total area of this unit is Chillum silt loam, and about 25 percent is Neshaminy silt loam. The Nashaminy soil is in relatively small areas that could not be separated on the maps at the scale used. These soils have profiles similar to those described as representative of the respective series. Included in mapping are a few areas of nearly level soil and some widely scattered, severely eroded areas.

This complex mapping unit is suited to cultivated crops, pasture, and trees. The principal limitation to use is the moderate depth to the hard gravelly substratum of the Chillum soil, but there is also a moderate hazard of further erosion. Capability unit IIs–7; woodland subclass 3o.

Chillum-Neshaminy silt loams, 5 to 10 percent slopes, moderately eroded (CkC2).—About 67 percent of this mapping unit is Chillum silt loam, and about 33 percent is Neshaminy silt loam. These soils have profiles similar to those described as representative of their respective series. Included in mapping are small severely eroded areas, some of which are gullied. About 33 percent of the area has smooth, rounded gravel in the surface layer.

The severe hazard of further erosion is the most important factor in management of these soils. Capability unit IIIe–7; woodland subclass 3o.

Chillum-Neshaminy gravelly silt loams, 10 to 15 percent slopes, moderately eroded (CkD2).—More than 50 percent of this complex is Chillum silt loam, and most of the remainder is Neshaminy silt loam. These soils have profiles similar to those described as representative of their respective series.

Included with these soils in mapping are areas where

the subsoil is highly clayey and is redder than the surrounding Neshaminy soil. Soil in these areas has characteristics of the Montalto series. Also included are many small areas of severely eroded soils and some acreage where slope is more than 15 percent.

The hazard of further erosion is severe, and only an occasional cultivated crop ought to be grown. The soil is well suited to pasture and trees. Capability unit IVe–7; woodland subclass 3o.

Chillum-Urban land complex, 0 to 5 percent slopes (ClB).—This complex consists of level to gently sloping Chillum soils that have been used for residential or other nonfarm purposes. The soil profile has been drastically altered in many places.

Included with this complex in mapping are small areas of soils that do not have a hard, gravelly substratum. In some of these soils the substratum is loose and sandy, and in others hard bedrock is at a depth of 4 to 10 feet.

In about 30 percent of the area of this complex the soils are relatively undisturbed. In about 55 percent of the area the soils have been covered by as much as 18 inches of fill material, or they have had as much as two-thirds of the original profile removed by cutting or grading. The remaining 15 percent of the area is Urban land. Where the soils have been covered by fill material to a depth of more than 18 inches, most or all of the profile has been graded away. The fill material is variable, but most of it is silty.

Generally drainage is good, and wetness does not limit suitability of the soil for nonfarm uses. The soils and most fill material are suited to grasses, shrubs, and other vegetation. Pavements and buildings are in part of the complex. Suitability of deeply filled or cut areas must be determined at the site. Capability unit and woodland subclass not assigned.

Chillum-Urban land complex, 5 to 15 percent slopes (ClD).—This complex consists of gently sloping to moderately sloping Chillum soils that have been used for residential or other nonfarm uses.

Included with this complex in mapping are scattered small areas where residuum from underlying rocks or loose sandy material is fairly close to the surface. Also included are a few acres where slope is more than 15 percent.

In about 20 percent of the total area of this complex the soils are relatively undisturbed. In about 40 percent of the area the soil has been covered by as much as 18 inches of fill material, or as much as two-thirds of the original profile has been removed by cutting or grading. The remaining 40 percent of the area is Urban land. Where the soil has been covered by fill material to a depth of more than 18 inches, most or all of the profile has been cut away. The fill material is mostly silty and is from adjacent areas of the same kind of soils or similar ones. In places the fill contains pebbles that are as much as 2 inches in diameter.

Except where soil conditions have been drastically altered, drainage is good and wetness does not limit suitability for use. Slope is a limiting factor for many uses, mostly because of the hazard of erosion. The relatively undisturbed areas and most shallow fills are well suited to lawn grasses, ornamentals, and other vegetation. The suitability of soils in deeply filled areas, and especially of soils in deeply cut areas, must be determined for each site. Capability unit and woodland subclass not assigned.

Christiana Series

The Christiana series consists of deep, well-drained, gently sloping to moderately sloping soils on uplands of the Coastal Plain. These soils are mostly northeast of Baltimore City. They formed in thick deposits of plastic clay and are dominantly red in color. The native vegetation is mixed hardwoods, Virginia pine, and a ground cover of shrubs that are adapted to acid soils.

In a representative profile the surface layer is reddish-brown loam about 8 inches thick. The subsoil, to a depth of about 65 inches, is red silty clay. The underlying material to a depth of about 71 inches is gray or light-gray silt loam that is variegated with brighter colors. Beneath this is highly variegated, massive silty clay.

Christiana soils are very strongly acid to extremely acid and generally are low in natural fertility. They have a high available moisture capacity. Permeability is slow. The clayey subsoil severely limits Christiana soils for many of the more important nonfarm uses.

Representative profile of Christiana loam, 2 to 5 percent slopes, in an idle area on Route 7 at Rosedale:

Ap—0 to 8 inches, reddish-brown (5YR 4/4) loam; weak, fine, granular structure; friable, slightly sticky; common roots; very strongly acid; abrupt, smooth boundary.

B21t—8 to 35 inches, red (10YR 4/6) silty clay; strong, medium and coarse, prismatic and medium blocky structure; hard, firm, plastic and slightly sticky; common roots; red (10YR 5/6) clay films; reddish-gray (10YR 6/1) linings in root channels; very strongly acid; abrupt, irregular boundary.

B22t—35 to 47 inches, red (2.5YR 4/6) silty clay; moderate, very coarse, prismatic and moderate, medium, blocky and subangular blocky structure; hard, firm, sticky and plastic; few roots; reddish-brown (2.5YR 4/4) clay films; very strongly acid; abrupt, wavy boundary.

B23t—47 to 65 inches, red (10YR 4/6) silty clay; moderate, very coarse, prismatic and medium blocky structure; hard, very firm, sticky and plastic; very few roots; weak-red (10YR 4/4) clay films; ped interiors variegated with weak red (10YR 4/2), reddish-gray (10R 6/1), yellow (10YR 7/6), and pale brown (10YR 6/3); very strongly acid; clear, wavy boundary.

IIC1—65 to 71 inches, gray or light-gray (10YR 6/1) heavy silt loam, variegated with yellowish brown (10YR 5/8) and light yellowish brown (2.5Y 6/4); massive; slightly hard, friable, slightly sticky; very strongly acid; abrupt, broken boundary.

IIC2—71 to 84 inches, variegated red (10R 4/8), yellow (10YR 7/8), and light-gray (5Y 7/1) silty clay; massive; very hard, firm, plastic and sticky; very strongly acid.

In the A horizon, the hue generally is 7.5YR but ranges from 10YR to 5YR. The value ranges from 3 to 5 and the chroma from 1 to 6. The lowest values and chromas are in undisturbed A1 horizons and the highest are in undisturbed A2 horizons.

In the B horizon the hue generally is 2.5YR but commonly ranges to 10R and less frequently ranges to 5YR. The value ranges from 3 to 5 and the chroma from 4 to 8. The value of 3 and chroma of 4 are the least likely to be present. In many profiles the B horizon is free of variegations. The Bt horizon ranges from heavy silty clay loam to clay, and it is 40 to 60 percent clay.

In some profiles the C horizon is pale red to red and has few, if any, variegations. Content of clay in the C horizon ranges from less than to more than that of the B horizon.

The solum ranges from 60 to 96 inches or more in thickness. In many profiles the boundary between the B and C horizons is diffuse and not clearly defined.

Christiana soils are similar to Elioak, Hagerstown, Montalto, and Sunnyside soils in color and drainage. They do not have the micaceous C horizon of the Elioak soils. Christiana soils are much more strongly acid than the Hagerstown and Montalto soils, and they are much lower than those soils in natural plant nutrient content. Christiana soils are deep to bedrock whereas the Elioak, Hagerstown, and Montalto soils all have hard bedrock within a few feet of the surface. Christiana soils have much more clay and less sand in all horizons than Sunnyside soils.

Christiana loam, 2 to 5 percent slopes (CmB).—This soil has the profile described as representative of the series.

Included with this soil in mapping are areas where the surface layer is more silty than that described in the representative profile and some areas where the surface layer is somewhat more sandy. Some cleared areas have lost part of the surface layer through erosion, and in a few small areas erosion is severe. Also included are small areas that have been graded or otherwise disturbed for nonfarm uses.

The soil is suited to crops, pasture, and trees, but not much of it used for farming. The hazard of erosion is moderate. Capability unit IIe–42; woodland subclass 3c.

Christiana loam, 5 to 10 percent slopes, moderately eroded (CmC2).—The surface layer of this soil generally is thinner than that described in the representative profile, and in some places it is yellowish red in color. In some widely scattered spots part of the sticky, clayey subsoil is exposed. Minor areas have been cut or filled or otherwise disturbed for nonfarm uses.

The hazard of further erosion is severe on this soil, and little of it is cultivated. Capability unit IIIe–42; woodland subclass 3c.

Chrome Series

The Chrome series consists of shallow to moderately deep, well-drained, gently sloping to steep soils that have a clayey subsoil. These soils are on uplands of the Piedmont Plateau. They formed in material weathered in place from serpentine rock. The native vegetation is scrub oaks, redcedar, Virginia pine, and shortleaf pine.

In a representative profile the surface layer is dark grayish-brown channery silty clay loam about 2 inches thick. The subsoil, about 11 inches thick, is dark yellowish-brown channery silty clay loam that is sticky and very plastic. The underlying material is dark yellowish-brown very channery clay loam. Many flat fragments of serpentine are throughout the profile. The serpentine bedrock is at a depth of about 18 inches.

Chrome soils have low to moderate available moisture capacity. They are moderately permeable. They generally are only slightly acid. These soils are limited in use by depth to bedrock, by the plastic nature of the clayey subsoil, and by the hazard of erosion.

Representative profile of Chrome channery silty clay loam, 3 to 15 percent slopes, severely eroded, east of Deer Park Road, about 1.3 miles north of Deer Park:

Ap—0 to 2 inches, dark grayish-brown (10 YR 4/2) channery silty clay loam; moderate, fine, subangular blocky structure; friable, sticky; common roots; very strongly acid; abrupt, smooth boundary.

B2t—2 to 13 inches, dark yellowish-brown (10YR 4/4) channery heavy silty clay loam; weak, coarse, blocky structure; firm, sticky and very plastic; roots common; faint, discontinuous clay films; about 20 percent angular serpentine gravel; slightly acid; clear, irregular boundary.

C—13 to 18 inches, dark yellowish-brown (10YR 4/4) very channery clay loam; inherent rock structure visible; firm, sticky; very few roots; light olive-brown (2.5Y 5/4) pebble surfaces; many, fine, black specks; neutral; abrupt, irregular boundary.

R—18 inches, hard, unweathered serpentine.

The horizon ranges from 10YR to 2.5Y in hue, 3 to 5 in value, 1 to 4 in chroma. The lowest values and chromas are limited to thin, undisturbed A1 horizons, and the highest are limited to A2 horizons. Texture of the original A horizon is silt loam, but the Ap horizon ranges to clay loam or silty clay loam, depending upon the depth of plowing and especially upon the severity of accelerated erosion.

In the Bt horizon the hue is 10YR or sometimes 7.5YR, and value and chroma are 3 or 4. Texture of the Bt horizon centers on heavy silty clay loam but includes heavy clay loam and light silty clay. The Bt horizon is more than 35 percent clay, has a low volume weight, and is very difficult to compact. It has maximum dry density but the liquid limit and plasticity index are high, and it has optimum moisture for compaction.

The C horizon is similar to the Bt horizon in color and texture of the fine material, but it is variegated in places and has higher values and chromas.

The solum ranges from 10 to 20 inches in thickness. Depth to bedrock ranges from 20 to 40 inches in areas where erosion is not severe. Much of the total area is in severely eroded soils, however, and in places solum thickness and depth to bedrock are considerably less than the specified range. Serpentine fragments and stones are common in many areas, particularly in severely eroded soils.

Chrome soils do not closely resemble any other soils in Baltimore County. They formed in the same kind of material as the moderately well drained Aldino soils.

Chrome silt loam, 3 to 8 percent slopes, moderately eroded (CnB2).—This soil is not so severely eroded as the one described as representative of the series. Because of this the surface layer is silt loam rather than channery silty clay loam, and generally is 4 to 8 inches thick. The subsoil is also thicker, and bedrock is at a depth of 20 to 36 inches.

The soil is suited to cultivated crops, pasture, and trees. It has some limitations in use for deep-rooted plants because of limited depth to bedrock. The hazard of further erosion is moderate. Capability unit Ie–10; woodland subclass 4c.

Chrome channery silty clay loam, 3 to 15 percent slopes, severely eroded (CoC3).—This soil has the profile described as representative of the series. Because of soil loss through erosion, depth to bedrock is seldom more than 20 inches and in many places is less than 12 inches. Some loose serpentine stones are on this soil and there are outcroppings of hard rock.

The hazard of further erosion is severe. The soil is not suited to cultivated crops, but it is suited to pasture and trees that are adapted to the shallow depth to bedrock. Capability unit VIs–32; woodland subclass 6d.

Chrome channery silty clay loam, 15 to 45 percent slopes, severely eroded (CoE3).—This soil is so steep, so eroded, and so shallow that it is of little use except for adapted species of trees, wildlife habitat, and outdoor recreation. It has severe limitations even for these uses.

Loose stones and rock outcrops are common. Capability unit VIIs–32; woodland subclass 6d.

Clay Pits

Clay pits (Cp) consists of excavations from which clay has been mined. Most of the clay is very fine and is of the Cretaceous age. Most of the pits are within areas of Christiana soils or are associated with these soils. The clay that has been removed generally has been used for making bricks.

Except for the continuous mining of clay, the use of these pits depends on conditions at each site and the proposed use. Possible uses include ponds, wildlife habitat, recreation areas, and landfill areas for solid waste disposal. Capability unit VIIIs–4; woodland subclass not assigned.

Coastal Beaches

Coastal beaches (Ct) consists of strips of land along the shores of Chesapeake Bay and estuaries of some of the major streams of the county. They are mostly noncoherent loose sand that has been worked and reworked by wind and waves. Some areas are clayey sand, and in places the land is shelly. The beaches generally are smooth, but some are hummocky, and have short slopes. No soil development has occurred, and little, if any, vegetation grows, but some American beachgrass, beach goldenrod, and switchgrass are present. The land is better suited to outdoor recreation than to other uses. It is used as habitat by some kinds of wildlife. Capability unit VIIIs–2; woodland subclass not assigned.

Codorus Series

The Codorus series consists of deep, moderately well drained to somewhat poorly drained, level or nearly level soils on flood plains. These soils are mainly on the Piedmont Plateau, but some areas extend along the major streams into the upper part of the Coastal Plain. The fluctuating water table is seasonally very high, and the soils are subject to flooding at irregular intervals. The native vegetation is mixed hardwoods that tolerate excess wetness.

In a representative profile the surface layer is silt loam about 10 inches thick. This layer is dark grayish brown in the upper part and yellowish brown in the lower part. The subsoil, about 42 inches thick, is dark yellowish-brown silt loam. It is mottled with dark grayish brown and dark red in all but the upper 7 inches. The underlying material is dark yellowish-brown gravelly fine sand that includes some thick lenses of silty material. Mica flakes are common throughout the profile, especially in the underlying material.

Codorus soils are fairly easy to work where moisture content is favorable, but they generally are wet in spring and are fairly slow to warm. These soils are subject to flooding in spring, and plowing and planting frequently are delayed. Available moisture capacity is high. Permeability is moderate, and water moves through the soil readily but not rapidly. Artificial drainage benefits most crops, and it helps to lengthen the period of grazing on pasture. These soils are fairly easy to drain if adequate outlets are available. Drainage is desirable chiefly to lower the water table in spring in time for cultivation. It can be improved more easily in fields that are protected from flooding and from runoff from higher lying soils than in areas not protected.

Representative profile of Codorus silt loam, in a nearly level wooded area on the west side of Thornton Mill Road, about 2¼ miles north of Cockeysville:

A11—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium, granular structure; very friable; many roots; some fine mica flakes; slightly acid; clear, wavy boundary.

A12—6 to 10 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, granular structure; loose to very friable; common roots; high content of very fine sand; some fine mica flakes; slightly acid; clear, wavy boundary.

B1—10 to 17 inches, dark yellowish-brown (10YR 3/4) loam; weak, fine, subanular blocky structure; friable; common roots; many mica flakes; slightly acid; gradual, wavy boundary.

B2—17 to 27 inches, dark yellowish-brown (10YR 3/4) silt loam; a few, fine, distinct mottles of dark red (2.5YR 3/6) and common, medium, faint mottles of dark grayish brown (10YR 4/2); weak, medium, subangular blocky structure; friable, many roots; many mica flakes; medium acid; gradual wavy, boundary.

B3—27 to 52 inches, dark yellowish-brown (10YR 3/4) silt loam; a few, fine, distinct mottles of dark red (2.5YR 3/6) and common, medium, faint mottles of dark grayish brown (10YR 4/2); very weak, medium, subangular blocky and weak, medium, platy structure; firm, slightly sticky; common roots in upper part; many mica flakes; strongly acid; clear, wavy boundary.

IIC—52 to 78 inches, dark yellowish-brown (10YR 3/4) gravelly fine sand; massive; firm; some thick lenses of silty material; many mica flakes; very strongly acid.

Hue throughout the profile is mostly 10YR, but it ranges to 7.5YR in some horizons. In the A horizon value ranges from 3 to 5 and chroma from 1 to 4. The value of 3 is limited to undisturbed A11 horizons less than 6 inches thick.

In the B horizon, the value ranges from 3 to 5 and the chroma is 3 or 4. High-chroma mottling occurs in places and is lacking in others.

The IIC horizon has the same color range as the B horizon, and occurrence of mottling is the same. It consists of sediment that is different than that in the solum and that generally is coarser textured but in places is finer textured.

The solum ranges from 42 to 60 inches in thickness. Depth to bedrock ranges from 6 to 20 feet or more. Some smooth gravel is in the profile, but it generally is not abundant except in places in the IIC horizon. The solum is mostly silt loam, but parts of the B horizon are loam or silty clay loam.

Codorus soils resemble Iuka and Lindside soils in color, in drainage, and in position on flood plains. They contain more clay and are more micaceous than Iuka soils. Codorus soils are more strongly acid than Lindside soils and generally are less fertile. They formed in the same kind of material and in similar positions as the well-drained Comus soils and the poorly drained Hatboro soils.

Codorus silt loam (Cu).—This is the only Codorus soil mapped in the county. Most of the soil is nearly level, but in a few acres slopes are as much as 3 percent. Also, in places traces of slightly depressed old stream channels occur.

Where the hazard of flooding is no more than moderate, this soil is suited to cultivated crops. Some crops, however, benefit from improved drainage. Any areas that are subject to severe or frequent flooding can be used for trees or for seasonal pastures. Capability unit IIw–7; woodland subclass 1w.

Comus Series

The Comus series consists of deep, well-drained, nearly level soils on flood plains. These soils are mainly on the Piedmont Plateau, but some areas extend along the major streams into the Coastal Plain. They are naturally strongly acid. The Comus soils are subject to flooding. The native vegetation is mainly oaks, black walnut, hickory, beech, elm, and maple.

In a representative profile the surface layer is silt loam about 13 inches thick. The upper part of this layer is very dark grayish brown, and the lower part is brown or dark brown. The subsoil, about 17 inches thick, is dark yellowish-brown crumbly silt loam that is slightly sticky. The underlying material, to a depth of 60 inches, is stratified fine sandy loam and silty material that is also dark yellowish brown.

Comus soils are well suited to farming and to many nonfarm uses. They have a moderate to high available moisture capacity, and they are moderately permeable. They have moderate to severe limitations for use because of the flood hazard.

Representative profile of Comus silt loam, in a nearly level wooded area on the flood plain of the Patapsco River, about one mile east of Elkridge.

A11—0 to 5 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; very friable; many roots; slightly acid (limed); clear, wavy boundary.

A12—5 to 13 inches, brown or dark-brown (10YR 4/3) light silt loam; single grain to very weak, fine, granular structure; loose to very friable; many roots; medium acid; abrupt, smooth boundary.

B2 13 to 30 inches, dark yellowish-brown (10YR 4/4) silt loam; moderate, medium, granular structure; friable, slightly sticky; many roots; strongly acid; abrupt, smooth boundary.

IIC—30 to 60 inches, dark yellowish-brown (10YR 3/4) fine sandy loam; massive; very friable; few roots; some thin strata of silty material; strongly acid.

In the A and B horizons, the hue centers on 10YR but ranges to 5YR. Value ranges from 3 to 5 and chroma from 2 to 4. The value of 3 is limited to A1 horizons less than 6 inches thick. In both A and B horizons the texture generally is silt loam, but the B horizon is loam in places. Both of these horizons are more than 50 percent silt and 10 to 18 per cent clay.

The color of the IIC horizon ranges from pale brown (10YR 6/3) to dark brown (10YR 4/3 or 7.5YR 4/4) or dark yellowish brown (10YR 3/4). At depths of more than 36 inches some low-chroma mottles or streaks are present. The IIC horizon ranges in texture from sand to silty clay and is gravelly in places. It differs abruptly in texture from the horizon above it.

The depth to unconforming material in the profile ranges from about 30 to 40 inches, and the depth to bedrock ranges from about 6 feet to more than 20 feet. As much as 10 percent of the A and B horizons is waterworn pebbles. As much as 40 percent of the IIC horizon is pebbles.

Comus soils formed in the same kind of material as the moderately well drained to somewhat poorly drained Codorus soils and the poorly drained Hatboro soils.

Comus silt loam (Cv).—This is the only Comus soil mapped in the county. Most of it is nearly level, but in places slopes are 4 percent. This soil is flooded at infrequent intervals. Traces of old stream channels and low natural levees are along some streams.

This soil is well suited to cultivated crops, pasture, and trees in most areas. Some areas are frequently or severely flooded. Any areas so flooded generally are used for trees or pasture. Capability unit I–6; woodland subclass 1o.

Conestoga Series

The Conestoga series consists of deep, well-drained, gently sloping to moderately sloping soils on uplands of the Piedmont Plateau. These soils are mostly on broad ridgetops and adjacent hillsides. They formed in material weathered in place from calciferous mica schists and associated marble or limestone. The native vegetation is mixed upland hardwoods, mainly oaks, but in places are black walnut, black locust, and other trees that normally use large amounts of lime.

In a representative profile the surface layer is dark yellowish-brown loam about 8 inches thick. The subsoil, about 33 inches thick, is strong-brown clay loam or silty clay loam that is sticky and plastic in the upper part and contains many mica flakes in the lower part. The underlying material is disintegrated rock that is banded with various colors. This material overlies bedrock which is at a depth of about 80 inches.

Conestoga soils are very strongly acid in the upper part of the profile, but they are less acid and contain more lime as depth increases. They are easily worked, have a high available moisture capacity, and are highly productive under good management. They have moderate permeability. These soils have few limitations for farming or for other uses, except those imposed by slope, erosion hazard, or rockiness.

Representative profile of Conestoga loam, 3 to 8 percent slopes, moderately eroded, in a gently sloping idle area about 300 feet north of Merryman's Mill Road, about 2½ miles east of Cockeysville:

Ap—0 to 8 inches, dark yellowish-brown (10YR 4/4) loam; weak, fine, granular structure; very friable, slightly sticky; common roots; some worm casts; a few angular quartzite fragments; very strongly acid; abrupt, smooth boundary.

B21t—8 to 21 inches, strong-brown (7.5YR 5/6) silty clay loam; weak, medium, subangular blocky structure; firm, sticky and plastic; common roots, discontinuous clay films; some worm casts and mica flakes; some angular quartzite gravel and stones; very strongly acid; gradual, wavy boundary.

B22t—21 to 33 inches, strong-brown (7.5YR 5/6) heavy clay loam; weak, medium, subangular blocky structure; firm, sticky and plastic; few roots; continuous clay films; some mica flakes; much angular quartzite gravel and some stones; very strongly acid; gradual, wavy boundary.

B3—33 to 41 inches, strong-brown (7.5YR 5/6) clay loam; weak, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; many mica flakes; much angular quartzite gravel and some stones; strongly acid; gradual, wavy boundary.

C—41 to 80 inches, yellowish-brown (10YR 5/6) clay loam; many narrow bands of olive-brown (2.5Y 4/4) loamy sand; structureless, massive and single grain; friable; fine material is slightly sticky and slightly plastic; some red (2.5YR 4/8) banding in lower part; medium acid; abrupt, irregular boundary.

R—80 inches, hard impure limestone.

The hue throughout the profile is either 10YR or 7.5YR. In the A horizon, color value ranges from 3 to 5 and chroma from 1 to 4. The value of 3 is limited to undisturbed A1 horizons less than 6 inches thick.

In the B horizon color value ranges from 4 to 6 and chroma from 4 to 8. The texture of the B horizon is loam, silt loam, silty clay loam, or clay loam.

The C horizon is more variable in color than the A and B horizons, is coarser in texture than the B horizon, and is micaceous in places.

The solum ranges from about 40 to 70 inches in thickness. Depth to bedrock ranges from about 4 to 10 feet. In the subsoil are coarse gravel and stone of limestone, marble, calciferous schist, and remnant quartzite.

Conestoga soils are similar to Chester and Hollinger soils in many ways. They are less acid and contain more lime and other nutrients than Chester soils, which are redder in places than the Conestoa soils, particularly in the lower part of the subsoil. Conestoga soils have a thicker solum than Hollinger soils and have a more strongly differentiated subsoil or Bt horizon. The Conestoga and Hollinger soils formed in essentially the same kind of weathered rock material, and they are closely associated in the landscape.

Conestoga loam, 3 to 8 percent slopes, moderately eroded (CwB2).—This soil has the profile described as representative of the series. The surface layer is dark yellowish brown because it has been mixed with material from the subsoil.

Included with this soil in mapping are some small, nearly level areas and some widely scattered, severely eroded spots. A few acres have been graded or otherwise disturbed for nonfarm uses.

The hazard of further erosion on this soil is moderate. The soil is well suited to nearly all uses and it is one of the more productive upland soils of the county. Capability unit IIe–24; woodland subclass 1o.

Conestoga loam, 8 to 15 percent slopes, moderately eroded (CwC2).—The surface layer of this soil is thinner than that described in the representative profile. Newly plowed areas appear spotty because of differences in the amount of subsoil that has been mixed into the surface layer by plowing. About 10 percent of the total acreage has lost most of the surface layer, and there are occasional gullies. A few acres have been graded or otherwise disturbed for nonfarm uses.

The hazard of further erosion is severe in cultivated areas. Intensive good management that includes appropriate erosion control helps to maintain the soil in a safe condition for continued farming. Capability unit IIIe 24; woodland subclass 1r.

Delanco Series

The Delanco series consists of deep, moderately well drained, acid, gently sloping soils on terraces along some major streams. These soils are mostly on the Piedmont Plateau, but some extend along streams into the Coastal Plain. They formed in very old alluvium that washed from the uplands of the Piedmont Plateau. The native vegetation is mixed hardwoods.

In a representative profile the surface layer is silt loam about 13 inches thick. The upper part of the surface layer is brown or dark brown in color, and the lower part is dark yellowish brown. The subsoil, about 26 inches thick, is brown to strong-brown clay loam or silty clay loam. It is mottled with grayish colors at depths below about 27 inches. The underlying material is massive clay loam of various colors. It contains abundant fine flakes of mica.

Delanco soils have a high available moisture capacity and moderately slow permeability. They are suited to cultivated crops, pasture, and trees but are somewhat limited for these uses because of seasonal wetness. This wetness causes moderate to severe limitations for many nonfarm uses.

Representative profile of Delanco silt loam, 3 to 8 percent slopes, in a field on Western Run Road about 3½ miles northwest of Cockeysville:

Ap—0 to 8 inches, brown or dark-brown (10YR 4/3) silt loam; moderate, coarse, granular structure; very friable; many roots; slightly acid (limed); clear, smooth boundary.

A2—8 to 13 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine, subangular blocky structure; friable; common roots; strongly acid; gradual, wavy boundary.

B1—13 to 19 inches, brown or dark-brown (7.5YR 4/4) light silty clay loam; weak, medium, subangular blocky structure; firm, slightly sticky and slightly plastic; common roots; strongly acid; gradual, wavy boundary.

B2t 19 to 27 inches, strong-brown (7.5YR 5/6) silty clay loam; variegated with yellowish brown (10YR 5/8); weak, medium, subangular blocky structure; firm, sticky and plastic; few roots; discontinuous clay films; medium acid; clear, wavy boundary.

B3—27 to 39 inches, strong-brown (7.5YR 5/6) clay loam, variegated with yellowish brown (10YR 5/8); common, medium, prominent mottles of light brownish gray (10YR 6/2); weak, coarse, blocky structure; friable, slightly sticky and slightly plastic; very few roots; strongly acid; diffuse boundary.

C—39 to 72 inches, variegated yellowish-red (5YR 4/6), yellowish-brown (10YR 5/8), and light brownish-gray (10YR 6/2) clay loam that grades to loam with depth; massive; friable, slightly sticky and slightly plastic; many mica flakes in lower part; very strongly acid.

The A horizon ranges from 10YR to 2.5Y in hue, from 3 to 6 in value, and from 1 to 4 in chroma. The lowest value is limited to thin, undisturbed A1 horizons, and the highest chroma is limited to A2 horizons.

The B horizon ranges from 10YR to 7.5Y in hue, from 4 to 7 in value, and from 4 to 8 in chroma. The lower part is mottled with grayish colors and generally with high-chroma colors. The texture of the Bt horizon is silty clay loam, clay loam, loam, or silt loam, and it is 18 to 30 percent clay.

The C horizon is variable in color, friable to firm, moderately to highly micaceous, and is gravelly in places. It has clear lines of stratification.

The solum ranges from about 26 to 46 inches in thickness. Depth to bedrock ranges from 5 feet to more than 20 feet. Some waterworn pebbles are in these soils, mostly in the C horizon.

Delanco soils are similar to Mattapex and Woodstown soils in color and in drainage. They are not so silty in the solum as Mattapex soils and not so sandy in the Bt horizon as Woodstown soils. Delanco soils formed in the same kind of old alluvium as the well-drained Elsinboro soils.

Delanco silt loam, 3 to 8 percent slopes (DcB).—This is the only Delanco soil mapped in the county. Cutting, grading, and smoothing of the soil for nonfarm uses has occurred in places.

Included with this soil in mapping are a few acres that are nearly level and a few that have slopes of more than 8 percent. Small areas have lost some of the surface layer through erosion.

The soil is suited to intensive cultivation as well as to pasture and trees. Little artificial drainage is needed for most crops, but spot drainage is beneficial on some more level areas. Careful disposal of excess runoff water is necessary because of the moderate hazard of erosion. Capability unit IIe–16; woodland subclass 2o.

Dunning Series

The Dunning series consists of deep, very poorly drained, nearly level soils on flood plains in limestone valleys on the Piedmont Plateau. These soils are naturally neutral or only slightly acid, and they are subject to flooding at irregular intervals. The native vegetation is wetland hardwoods, but most of the soils have been cleared.

In a representative profile the surface layer is very dark brown and black silt loam about 19 inches thick. The subsoil, about 18 inches thick, is mottled with yellowish brown and is dark-gray silty clay that is sticky and plastic. The underlying material is mottled dark-gray sandy clay loam to a depth of about 48 inches. Gravelly coarse sand extends to a depth of about 60 inches.

The Dunning soils have high available moisture capacity and slow permeability. Where they are not frequently flooded, Dunning soils are suited to cultivated crops, pasture, and trees. Drainage improvement is needed for crops and for improved pasture. The very poor natural drainage and the flood hazard are severe limitations for most nonfarm uses.

Representative profile of Dunning silt loam, in a nearly level area on the north side of Oregon Branch, about one-half mile west of Cockeysville:

Ap—0 to 11 inches, very dark brown (10YR 2/2) silt loam; few, fine, faint mottles of strong brown (7.5YR 5/6); moderate, fine, subangular blocky structure; friable, sticky; many roots; neutral; abrupt, smooth boundary.

A1—11 to 19 inches, black (10YR 2/1) silt loam; weak, fine, subangular blocky structure; friable, sticky; common roots; slightly acid; abrupt, smooth boundary.

Bg—19 to 37 inches, dark-gray (10YR 4/1) silty clay; many, fine, prominent mottles of yellowish brown (10YR 5/6); weak, coarse, blocky structure; firm, sticky and plastic; few roots; slightly acid; abrupt, smooth boundary.

IIC1g—37 to 48 inches, dark-gray (10YR 4/1) sandy clay loam; few, medium, distinct mottles of light olive brown (2.5Y 5/4); structureless, massive; friable, sticky and slightly plastic; slightly acid; gradual, smooth boundary.

IIIC2g—48 to 60 inches, olive-gray (5Y 4/2) gravelly coarse sand; single grain; loose; slightly acid.

The A horizon generally is 10YR in hue, the value is 2 or 3, and the chroma ranges from 0 to 2. The color is neutral in places.

In the B and the C horizon, hue ranges from 10YR to 5GY or 5BG, value from 4 to 6, and chroma from 0 to 2. The color is neutral in places. Mottling in these horizons has chromas ranging from 3 to 6.

The B horizon ranges from heavy silty clay loam to clay, and it is 35 to 50 percent clay. Structure in the B horizon is weak to moderate and blocky to prismatic.

The C horizon is older and coarser textured sediment than the A and B horizons. It ranges from sand to sandy clay loam or clay loam and is gravelly in places.

The solum ranges from about 30 to 40 inches in thickness. Depth to unconforming bedrock is about 6 to 10 feet or more. Little or no gravel is in the solum, but considerable gravel is in the unconforming C horizon.

Dunning soils do not closely resemble any other soils of Baltimore County. They are on similar but more clayey old alluvium than the poorly drained Melvin and the moderately well drained Lindside soils.

Dunning silt loam (Du).—This is the only Dunning soil mapped in the county. It is nearly level and is on flood plains and in depressions in areas within flood plains. Where there is no more than a moderate hazard of flooding, the soil is used mostly for corn and pasture. Areas subject to severe or frequent flooding generally are kept in trees or are used for seasonal grazing. Intensive drainage measures are needed to attain full use in farming. Capability unit IVw 3; woodland subclass 1w.

Edgemont Series

The Edgemont series consists of moderately deep to deep, well-drained, gently sloping to steep soils on uplands of the Piedmont Plateau. These soils are on elevated ridges. They formed in material weathered in place from hard acid rocks, principally quartzite. They contain moderate amounts of coarse gravel and stone fragments of quartzite. The native vegetation is mixed upland hardwoods and Virginia pine.

In a representative profile the surface layer is very stony loam about 8 inches thick. This layer is dark brown in the very thin upper part and dark yellowish brown in the thicker lower part. The entire layer is interspersed with quartzite stones. The subsoil, about 26 inches thick, is brown or dark-brown sandy clay loam and strong-brown sandy loam that contains gravel and stones of quartzite. The underlying material is reddish-yellow gravelly and stony loamy sand that contains many fine mica flakes. The bedrock of quartzite is at a depth of about 47 inches.

Edgemont soils are very strongly acid and are easy to work except where they are too stony. The hard quartzite gravel is very abrasive and damages plows and other farm equipment. These soils have moderate to high available moisture capacity and moderately rapid permeability. Nonstony areas are suited to cultivated crops and pasture, but stony areas are limited to trees and pastures. Depth to hard bedrock, slope, erosion, and stoniness limit Edgemont soils for many nonfarm uses.

Representative profile of Edgemont very stony loam, 8 to 25 percent slopes, in a wooded area on Duncan Hill Road, about 1½ miles northeast of Butler:

A1—0 to 1 inch, dark-brown (10YR 3/3) very stony loam; weak, fine, granular structure; very friable; many roots; interspersed with quartzite stones; some angular quartzite gravel; very strongly acid; clear, wavy boundary.

A2—1 to 8 inches, dark yellowish-brown (10YR 4/4) very stony loam; weak, fine, granular structure; very friable; common roots; interrupted by quartzite stones; some angular quartzite gravel; very strongly acid; clear, wavy boundary.

B2t—8 to 23 inches, brown or dark-brown (7.5YR 4/4) sandy clay loam; weak to moderate, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; some thin clay films and bridging; some angular quartzite gravel and stones; very strongly acid; gradual, wavy boundary.

B3—23 to 34 inches, strong-brown (7.5YR 5/6) sandy loam, brown or dark brown (7.5YR 4/4) bands; weak, fine, granular structure; very friable, slightly sticky; common roots; many angular quartzite stones and smaller fragments; few mica flakes and micaceous fragments; very strongly acid; clear, wavy boundary.

C—34 to 47 inches, reddish-yellow (7.5YR 6/8) loamy sand; single grain; loose; few roots; many angular quartzite stones and smaller fragments; many mica flakes; very strongly acid; abrupt, irregular boundary.

R—47 inches, irregularly weathered quartzite.

In all horizons the hue is either 10YR or 7.5YR. In the A horizon the color ranges in value from 2 to 5 and in chroma

from 1 to 4. The value of 2 or 3 is limited to the very thin A1 horizon. In cultivated areas the plow layer generally is dark grayish brown.

In the B horizon value ranges from 4 to 7 and chroma from 4 to 8. The B horizon centers on sandy clay loam but ranges to loam, fine sandy loam, or clay loam.

In the C horizon colors generally have higher value and chroma than those in the B horizon, and in places in the C horizon colors are veriegated. The C horizon ranges from loamy sand to loam.

The solum ranges from about 30 to 40 inches in thickness. Depth to bedrock ranges from about 3½ to 5 feet. Gravel is common in all horizons but not abundant. Some areas of these soils are very stony.

Edgemont soils contain more coarse fragments than Chester and Glenelg soils and are somewhat shallower to hard bedrock. The Edgemont soils are similar to Brandywine soils in color and drainage, but they have a finer textured subsoil that contains fewer and coarser rock fragments than the Brandywine soils.

Edgemont gravelly loam, 3 to 8 percent slopes, moderately eroded (EdB2).—The profile of this soil is similar to that described as representative of the series, except that there are few, if any, stones on or near the surface. Included in mapping are some scattered severely eroded spots and a few areas that have a small amount of gravel in the surface layer.

The soil is suited to cultivated crops, pasture, and trees. The hazard of further erosion is moderate. Capability unit IIe-4; woodland subclass 3o.

Edgemont gravelly loam, 8 to 15 percent slopes, moderately eroded (EdC2).—Some areas of this soil have a small amount of gravel in the surface layer. Some widely scattered spots are severely eroded and some areas are cut by shallow gullies.

This soil is suited to cultivated crops, pasture, and trees. Because of the severe hazard of further erosion, it needs intensive management and protection to keep it in condition for farming. Capability unit IIIe-4; woodland subclass 3o.

Edgemont very stony loam, 8 to 25 percent slopes (EgD).—This soil has the profile described as representative of the series. Included in mapping are a few acres of soils that have slopes of less than 8 percent and some spots where the soil is not very stony. Rock outcrops and boulders are present in places.

The soil is suited to trees, to wildlife habitat, and to limited grazing. If enough stones are removed, the soil is suited to hay crops and to permanent pasture. Capability unit VIs-3; woodland subclass 2r (north aspects) or 3r (south aspects).

Edgemont very stony loam, 25 to 45 percent slopes (EgE).—Most areas of this soil are wooded. A few acres have slopes of more than 45 percent.

Some wood products are harvested. The soil primarily is suited to wildlife habitat and to some kinds of outdoor recreation. Capability unit VIIs-3; woodland subclass 2r (north aspects) or 3r (south aspects).

Elioak Series

The Elioak series consists of deep, well-drained, gently sloping to moderately sloping soils on uplands of the Piedmont Plateau. These soils are mostly on the upper parts of hillsides and summits of hills. They formed in material weathered in place from acid crystalline rocks that are high in mica. The native vegetation is mixed hardwoods, mainly oaks.

In a representative profile the surface layer is silt loam about 9 inches thick. This layer is very dark grayish brown in the thinner upper part and brown or dark brown in the thicker lower part. The upper 7 inches of the subsoil is yellowish-red heavy silt loam. The next 14 inches is yellowish red silty clay loam. The lower 10 inches is yellowish-red silt loam. The underlying material is strong-brown loam derived from disintegrated mica schist rock.

Elioak soils are fairly easy to work if they are not too severely eroded. They are very strongly acid and have high available moisture capacity. They are moderately permeable. These soils are suited to cultivated crops, pasture, trees, and many nonfarm uses, except where use is limited by slope and erosion.

Representative profile of Elioak silt loam, 3 to 8 percent slopes, moderately eroded, in a wooded area, 200 feet from the north side of Bond Avenue, about 2 miles east of Reisterstown:

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; very friable; many roots; slightly acid; clear, wavy boundary.

A2—3 to 9 inches, brown or dark-brown (7.5YR 4/4) silt loam; weak, fine, subangular blocky structure; friable, slightly sticky; many roots; a few angular quartzite fragments; very strongly acid; clear, wavy boundary.

B1—9 to 16 inches, yellowish-red (5YR 4/6) heavy silt loam; weak, fine, subangular blocky structure; firm, slightly sticky; common roots; some dark-brown silt in old root channels; some angular quartzite gravel; very strongly acid; gradual, wavy boundary.

B21t—16 to 24 inches, yellowish-red (5YR 4/6) heavy blocky structure; firm, sticky and plastic; common roots; discontinuous clay films; some angular quartzite gravel; very strongly acid; gradual, wavy boundary.

B22t—24 to 30 inches, yellowish-red (5YR 4/6) silty clay loam; moderate, medium, subangular blocky structure; firm, slightly sticky and slightly plastic; common roots; discontinuous clay films; some angular quartzite gravel; very strongly acid; gradual, wavy boundary.

B3—30 to 40 inches, yellowish-red (5YR 4/6) silt loam, streaked with strong brown (7.5 YR 5/8); weak, coarse, subangular blocky structure; some weak, very fine platiness; few roots; some angular quartzite gravel; micaceous, size and number of flakes increases with depth; very strongly acid; gradual, wavy boundary.

C—40 to 87 inches, strong-brown (7.5YR 5/8) loam saprolite, variegated with red (2.5YR 4/6); inherent structure visible; friable; micaceous, size and number of flakes increases with depth; some soft fragments of mica schist; very strongly acid.

In the A horizon, hue ranges from 10YR to 5YR, value from 3 to 5, and chroma from 2 to 4. The value of 3 is limited to undisturbed A1 horizons less than 6 inches thick.

In the B horizon hue ranges from 5YR to 10R, value from 3 to 5, and chroma from 4 to 8. The Bt horizon is silty clay loam or finer material and is 35 to 45 percent clay.

The C horizon ranges from 15 inches to several feet in thickness. In this horizon color generally is variegated, but in places it is uniform and is in hue of 7.5YR or redder and value and chroma of 4 or more. The texture is loam, silt loam, or fine sandy loam that is high in silt. More mica is in the C horizon than is in the solum.

The solum ranges from about 30 to 50 inches in thickness. Depth of bedrock ranges from about 5 to 10 feet. In places

the surface layer, to about plow depth, contains 15 to 20 percent angular fragments of hard white quartzite. Vertical injections of quartzite, 4 to 10 inches thick, are at widely spaced intervals in undisturbed parts of the *solum* and in the C horizon.

Elioak soils are similar to Christiana, Hagerstown, Sunnyside, and Montalto soils in that they are well drained and have an essentially red Bt horizon. They are more strongly acid than Hagerstown and Montalto soils. Elioak soils are shallower to bedrock, have a thinner solum, and contain less clay in the Bt horizon than Christiana soils. They are more clayey and less sandy than Sunnyside soils. Elioak soils are more micaceous than any of the similar soils, particularly in the C horizon.

Elioak silt loam, 3 to 8 percent slopes, moderately eroded (EhB2).—This soil has the profile described as representative of the series. Included in mapping are a few areas of nearly level soils, some widely scattered spots that are severely eroded, and a few acres that have been graded or otherwise disturbed for nonfarm uses.

This soil is well suited to cultivated crops, pasture, and trees. The moderate hazard of further erosion is the most important limitation to farm use. Capability unit IIe–4; woodland subclass 2c.

Elioak silt loam, 8 to 15 percent slopes, moderately eroded (EhC2).—The surface layer of this soil generally is thinner than that in the profile described as representative of the series. Included in mapping are a few acres that have slopes greater than 15 percent.

The hazard of further erosion is severe, but good management that includes a program of intensive erosion control helps to keep the soil in condition for farming. This soil is suited to all common uses that are within the limits imposed by slope and hazard of further erosion. Capability unit IIIe–4; woodland subclass 2c.

Elioak gravelly silt loam, 3 to 8 percent slopes, moderately eroded (EkB2).—This soil has a profile similar to that described as representative of the series except the surface layer is about 15 to 20 percent hard, angular, white quartzite gravel. This gravel is abrasive and damages farm implements, but other than this it does not materially affect the suitability of the soil for use. Capability unit IIe–4; woodland subclass 2c.

Elioak gravelly silt loam, 8 to 15 percent slopes, moderately eroded (EkC2).—The hazard of further erosion is severe on this moderately sloping gravelly soil. The soil contains gravel that is abrasive and damages farm implements but does not significantly affect the suitability of the soil for use. If adequately protected against further erosion, the soil is suited to cultivated crops, pasture, trees, and many nonfarm uses. Capability unit IIIe–4; woodland subclass 2c.

Elioak silty clay loam, 8 to 15 percent slopes, severely eroded (E1C3).—The plow layer of this soil is yellowish-red to red, sticky silty clay loam. Included in mapping are a few acres that have slopes of more than 15 percent. In places areas are cut by shallow to deep gullies, and a few small areas contain hard gravel in the plow layer.

This soil is difficult to till and can only be worked within a narrow range of moisture content. It is considered marginal for cultivated crops because of the severe hazard of further erosion, poor tilth, and workability. It is better suited to hay crops, pasture, and trees. Capability unit IVe–3; woodland subclass 2c.

Elkton Series

The Elkton series consists of deep, poorly drained, nearly level, very strongly acid to extremely acid, dominantly gray soils. They have a fine-textured, slowly to very slowly permeable subsoil. These soils are on upland flats of the Coastal Plain. They formed in old deposits of highly clayey marine sediment. The native vegetation is willow oak, red maple, birch, and other hardwoods that tolerate wetness.

In a representative profile the surface layer is silt loam about 8 inches thick. This layer is dark grayish-brown in the very thin upper part and gray, mottled with yellowish brown in the thicker lower part. The subsoil, about 30 inches thick, is gray or light-gray silty clay loam and silty clay, and it is mottled with various shades of brown. This subsoil is sticky and is plastic to very plastic. The underlying material is slightly mottled, gray, massive silty clay loam that grades to silt with increasing depth.

Elkton soils must be worked at the right moisture content. They are hard when too dry and do not support heavy machinery well when too wet. They have a high water table and are wet for long periods. They have a high available moisture capacity. If drained, they are suited to corn, soybeans, and hay. Undrained areas generally are used for pasture or trees. Poor drainage and the high water table are the chief limitations to nearly all uses.

Representative profile of Elkton silt loam, in a recently cleared area about 300 feet east of Bletzer Road, 0.2 mile north of its intersection with North Point Road:

A1—0 to 1 inch, dark grayish-brown (10YR 4/2) silt loam; weak, medium, granular structure; friable, slightly sticky; roots common; very strongly acid; gradual, wavy boundary.

A2g—1 to 8 inches, gray (10YR 5/1) silt loam; common, fine, distinct mottles of yellowish brown (10YR 5/6); weak, fine, subangular blocky structure; firm, slightly sticky; few roots; very strongly acid; gradual, wavy boundary.

B1g—8 to 15 inches, gray or light-gray (10YR 6/1) silty clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/8); weak, medium, subangular blocky structure; firm, sticky and plastic; few roots; extremely acid; gradual, wavy boundary.

B21tg—15 to 28 inches, gray (N 5/0) silty clay; many fine and medium, prominent mottles of strong brown (7.5YR 5/8); weak, medium, subangular blocky structure; firm, sticky and very plastic; few roots; thick, prominent, discontinuous dark-gray (N 4/0) clay films; extremely acid; gradual, wavy boundary.

B22tg—28 to 38 inches, gray (10YR 5/1) silty clay loam; many, medium, prominent mottles of yellowish brown (10YR 5/8); weak, medium, subangular blocky structure; firm, sticky and plastic; very few roots; thin, discontinuous clay films; extremely acid; diffuse boundary.

Cg—38 to 84 inches, gray (10YR 5/1) silty clay loam, grading through silt loam to silt as depth increases; many coarse, faint mottles of grayish brown (10YR 5/2); massive; firm, slightly sticky and slightly plastic; a few dark reddish-brown (5YR 3/4) fine concretions; medium acid.

The A horizon is silt loam or loam in texture, and it generally is a few inches thicker where the texture is loam. In cultivated areas the plow layer is gray or dark gray.

In the B horizon, the matrix hue is 10YR, 2.5Y, 5Y, or the color is neutral. The value is 5 or 6, and the chroma ranges from 0 to 2. Mottles have a hue of 7.5YR or yellower, a value

of 4 or more, and a chroma of 2 to 8. The B horizon generally is silty clay or clay but is silty clay loam in places. It is 35 to 50 percent clay.

The color range of the C horizon is the same as that of the B horizon. The Cg horizon generally extends to great depths, but in places it is missing or is underlain by an unconforming IIC horizon of massive sandy clay loam, friable sandy loam, or loamy sand. The solum ranges from about 30 to 40 inches in thickness.

Elkton soils are similar to Baile, Fallsington, Leonardtown, Othello, and Watchung soils in that they are poorly drained and dominantly gray in color. They contain more clay in the Bt horizon than Baile, Fallsington, Leonardtown, and Othello soils. Elkton soils, unlike Leonardtown soils, do not have a fragipan in the lower part of the B horizon. They generally are more acid than Watchung soils. The Cg horizon of the Elkton representative profile is not so acid as is common for most survey areas. Elkton soils formed in the same general kind of clayey old sediment as the well-drained Christiana soils and the somewhat poorly drained Lenoir soils.

Elkton loam (Em).—This soil has a profile similar to that described as representative of the series, except that the surface layer contains more sand and less silt. Because of this the soil is easier to work than Elkton silt loam and provides better support for farm equipment. Also, the surface layer of this soil dries more quickly after rain than that of Elkton silt loam, and surface drainage is easier to accomplish. Capability unit IIIw–9; woodland subclass 3w.

Elkton silt loam (En).—This nearly level soil has the profile described as representative of the series. Included in mapping are a few acres that have slopes of slightly more than 2 percent.

This soil needs artificial drainage if it is to be used intensively. It generally is more difficult to work and to drain than Elkton loam. Capability unit IIIw–9; woodland subclass 3w.

Elkton-Urban land complex (Eo).—This complex consists of nearly level Elkton soils that have been used for residential or other nonfarm purposes. Included in mapping are areas where the subsoil is more highly silty and less clayey and sticky than typical Elkton soils.

In about 30 percent of the area of this complex, the soils are relatively undisturbed. In about 60 percent of the complex the soils have been covered by as much as 18 inches of fill material. The remaining 10 percent of the complex is Urban land, where the soils have been covered by more than 18 inches of fill material.

Although this complex has been artificially drained in most places, seasonal wetness and a high water table limit its use for building sites and for many other nonfarm uses. The fill materials are variable, and some of them are sandy or gravelly. Their suitability for plant growth should be determined on the site by observations, trials, and soil tests. Capability unit and woodland subclass not assigned.

Elsinboro Series

The Elsinboro series consists of deep, well-drained, gently sloping to moderately sloping soils on terraces along some major streams. These soils are mostly near the lower fringe of the Piedmont Plateau, and they extend along some streams into the Coastal Plain. They formed in old alluvium that washed mainly from areas of acid micaceous rocks. The native vegetation is oaks and other hardwoods. Many areas have been cleared.

In a representative profile the surface layer is loam about 9 inches thick. This layer is very dark grayish brown in the upper part and brown or dark brown in the lower part. The subsoil, about 29 inches thick, is strong-brown silt loam or silty clay loam that contains mica. In places in the subsoil are evidences of water-laid material or stratification. The underlying material is strong-brown, micaceous gravelly sandy loam that in places is streaked or mixed with other colors.

At a favorable moisture content Elsinboro soils are fairly easy to work. In spring they warm soon enough for all normal farming operations. These soils have high available moisture capacity and are moderately permeable. The principal limitations to all uses are slope and the hazard of erosion. These soils are close to streams, but they are seldom flooded.

Representative profile of Elsinboro loam, 3 to 8 percent slopes, in a wooded area east of the intersection of Caves Road and Park Heights Avenue:

A1—0 to 4 inches, very dark grayish-brown (10YR 3/2) loam; moderate, fine, granular structure; very friable; many roots; strongly acid; gradual, wavy boundary.

A2—4 to 9 inches, brown or dark-brown (10YR 4/3) loam; weak, medium, subangular blocky structure; friable to firm, slightly sticky; many roots; few subangular quartzite cobblestones; very strongly acid; clear, wavy boundary.

B21t—9 to 16 inches, strong-brown (7.5YR 5/6) silt loam; moderate, medium, subangular blocky structure; friable to firm; slightly sticky and slightly plastic; common roots; faint, dark-brown (7.5YR 4/4) clay films on some aggregates; mica flakes evident; some subangular quartzite cobblestones; very strongly acid; gradual, wavy boundary.

B22t—16 to 26 inches, strong-brown (7.5YR 5/6) silty clay loam; moderate, medium to coarse, subangular blocky structure; firm, plastic and slightly sticky; fairly common roots; distinct reddish-brown (5YR 4/4) clay films; some fine mica and subangular quartzite cobblestones; very strongly acid, gradual, wavy boundray.

B3—26 to 38 inches, strong-brown (7.5YR 5/8) silt loam; moderate, fine, subangular blocky structure; firm, slightly sticky; fairly common roots; many mica flakes, increasing in size and number with depth; some subangular quartzite cobblestones; very strongly acid; abrupt, wavy boundary.

IIC1—38 to 46 inches, strong-brown (7.5YR 5/6) gravelly sandy loam; massive; very firm, slightly sticky; few roots; many black mineral particles and mica flakes; some subangular cobblestones; very strongly acid; abrupt, wavy boundary.

IIC2—46 to 60 inches, variegated strong-brown (7.5YR 5/6) and dark-red (2.5YR 3/6) gravelly sandy loam; massive; very firm, slightly sticky; few black mineral particles and many mica flakes; some subangular cobblestones; very strongly acid.

The hue in the A horizon is 10YR or 7.5YR, the value is 3 or 4, and the chroma is 2, 3, or 4. The value is lowest in the A1 horizon. The texture of the A horizon is loam that is marginal to silt loam.

In the B horizon, the hue centers on 7.5YR but ranges to 5YR and 10YR. The value is 4 or 5, and the chroma generally is 6 or 8, but is 4 in some places where the hue is 5YR. The texture of the Bt horizon is heavy loam, silt loam, clay loam, or silty clay loam that is about 18 to 30 percent clay. Coarser textured Bt horizons generally are associated with coarser textured A horizons. Sharp differences in texture are apparent in places between layers in the B horizon, and these differences appear to reflect stratification.

The C horizon is of variable color and is variegated in places. It generally is more gravelly and more sandy than the solum. More than one unconformity is present within the C horizon in places.

The solum ranges from about 28 to 40 inches in thickness. Depth to unconforming bedrock ranges from about 6 feet to more than 20 feet. The content of waterworn pebbles and cobblestones is as much as 20 percent and generally is greatest in the IIC horizon. Strata, less than 2 inches thick, of fine waterworn pebbles are common, either in the solum or below it. The most evident mineral is mica, which increases sharply in amount in the IIC horizon.

Elsinboro soils are similar to Chester, Glenelg, and Sassafras soils. They have evidence of stratification, which is lacking in Chester and Glenelg soils. Elsinboro soils are more micaceous than Sassafras soils, but they are less micaceous than Glenelg soils. They are better drained than Delanco soils that are on the same terraces near waterways.

Elsinboro loam, 3 to 8 percent slopes (EsB).—This soil has the profile described as representative of the series. Included in mapping are a few areas of nearly level soils, some eroded spots, and some small areas where the surface layer is sandier than is typical of Elsinboro soils.

The soil is suited to cultivated crops, pasture, and trees. The hazard of erosion is moderate. Capability unit IIe–4; woodland subclass 2o.

Elsinboro loam, 8 to 15 percent slopes, moderately eroded (EsC2). The profile of this soil is similar to the one described as representative of the series except that the surface layer tends to be thinner. Included in mapping are some small, severely eroded spots. Also included are small areas of soils that slope more than 15 percent and some sandy spots.

The soil is suited to cultivated crops, pasture, and trees. The hazard of further erosion is severe where crops are cultivated without adequate protective measures. Capability unit IIIe–4; woodland subclass 2o.

Fallsington Series

The Fallsington series consists of deep, poorly drained, nearly level, dominantly gray soils on flats or on uplands of the Coastal Plain. These soils formed in old marine deposits of sandy materials that contain low to moderate amounts of silt and clay. The native vegetation is wetland oaks, maples, birch, holly, and in places pond pine.

In a representative profile the surface layer is sandy loam about 17 inches thick. This layer is very dark grayish brown in the very thin upper part and light brownish gray in the thicker lower part. The subsoil, about 23 inches thick, is gray or light-gray sandy clay loam that is mottled with strong brown. The underlying material is light-gray, massive sandy loam that is streaked with yellowish brown.

Fallsington soils are strongly acid to extremely acid and are easy to work when they are not too wet, but farming is delayed in spring until the water table has lowered. Because water moves readily through these soils, they are not difficult to drain where outlets are adequate. They have high available moisture capacity and are moderately permeable. Poor drainage and the high water table are the main limitations to nearly all uses.

Representative profile of Fallsington sandy loam, in a nearly level area about 450 feet from the end of Ulrich Road at Chase.

A1—0 to 1 inch, very dark grayish-brown (10YR 3/2) sandy loam; moderate, fine, granular structure; very friable; many roots; very strongly acid; clear, wavy boundary.

A2g—1 to 17 inches, light brownish-gray (2.5Y 6/2) sandy loam; many, coarse, distinct mottles of pale brown (10YR 6/3) and coarse, prominent mottles of strong brown (7.5YR 5/8); weak, medium, blocky structure; friable, slightly sticky; many roots; very strongly acid; diffuse boundary.

B21tg—17 to 31 inches, gray or light-gray (10YR 6/1) sandy clay loam; common, coarse, prominent mottles of strong brown (7.5YR 5/8); weak, coarse, blocky and medium, subangular blocky structure; firm, sticky and slightly plastic; common roots; distinct gray (N 5/0) clay films; extremely acid; diffuse boundary.

B22tg—31 to 40 inches, gray or light-gray (10YR 6/1) sandy clay loam; many, coarse, prominent mottles of strong brown (7.5YR 5/8); weak, coarse, blocky structure; firm, sticky and slightly plastic; few roots; some lenses of sandy clay; discontinuous clay films; extremely acid; gradual, wavy boundary.

Cg—40 to 70 inches, light-gray (10YR 7/2) sandy loam, streaks of yellowish brown (10 YR 5/6); massive; firm, slightly sticky; some lenses of white (10YR 8/2) silty clay that is sticky and plastic; very strongly acid.

The hue throughout the profile centers on 2.5Y but ranges to 10YR and 5Y. Some subhorizons are neutral in color.

The texture of the A horizon is sandy loam or loam. The color ranges in value from 2 to 6 and in chroma from 1 to 3. The values of 2 and 3 are limited to thin A1 horizons.

The texture of the Bt horizon is sandy clay loam, heavy loam, or heavy sandy loam. It is 18 to 25 percent clay. In the B horizon, the matrix color ranges in value from 4 to 6 and in chroma from 0 to 2. The B horizon generally is mottled with high-chroma colors.

The C horizon is coarser in texture than the B horizon and generally is coarser than the A horizon. In color it is similar to the B horizon, but in places it has a higher matrix value. Because of stratification, some profiles have an unconforming IIC horizon of abruptly different texture than the horizon immediately above it.

The solum ranges from about 24 to 40 inches in thickness. Fine, smooth quartz pebbles are present in places in the B and C horizons.

Fallsington soils resemble Baile, Elkton, Leonardtown, Othello, and Watchung soils in color and drainage. Fallsington soils have more sand in the Bt horizon than any of the similar soils and they are more readily permeable throughout the profile. Closely associated with Fallsington soils are the well-drained Sassafras soils, the moderately well drained Woodstown soils, and the very poorly drained Pocomoke soils, all of which formed in similar sediment.

Fallsington sandy loam (Fa).—This soil has the profile described as representative of the series. In most places it is nearly level, but in scattered areas the slopes are more than 2 percent. A few small areas have been filled or otherwise disturbed for nonfarm uses.

Drained areas are mainly for corn, but are also suited to soybeans, truck crops, hay, and pasture. Most undrained areas are in trees. Capability unit IIIw–6; woodland subclass 2w.

Fallsington loam (Fs).—This soil contains slightly less sand and more silt, especially in the surface layer, than the Fallsington sandy loam described as representative of the series. Included in mapping are some small areas that have slopes greater than 2 percent and some that have been filled or otherwise disturbed for nonfarm uses.

If drainage is adequate, this soil is well suited to most crops, especially corn and soybeans. It cannot be worked so easily or so early in spring as Fallsington sandy loam, because it is slower to drain and slower to warm. Capability unit IIIw–7; woodland subclass 2w.

Fort Mott Series

The Fort Mott series consists of deep, well-drained, level to gently sloping soils on uplands of the Coastal Plain. These soils have a very thick sandy surface layer. They formed in old marine deposits of sandy materials that contain small amounts of silt or clay. The native vegetation is scrub hardwoods, Virginia pine, and some hardwoods of greater economic value.

In a representative profile the surface layer is loamy sand about 28 inches thick. This layer is dark grayish brown in the upper part and yellowish brown in the lower part. The subsoil, about 6 inches thick, is brown or dark-brown friable sandy loam that is slightly sticky. The underlying material is light yellowish-brown sand that has narrow bands of dark-brown sandy loam. This material generally extends to great depths.

Fort Mott soils are strongly acid or very strongly acid and are easy to work. They have a low available moisture capacity, but they warm very quickly in spring and are among the earliest to be ready for planting. The Fort Mott soils have rapid permeability. The main limitation to use is the sandy material. These soils have only a slight hazard of erosion by water, but loose, dry surfaces are subject to soil blowing that carries sand to nearby fields and fence rows.

Representative profile of Fort Mott loamy sand, 0 to 5 percent slopes, in an area 400 feet from the north end of Beachwood Road on Back River Neck:

Ap—0 to 13 inches, dark grayish-brown (10YR 4/2) loamy sand; weak, fine, granular structure; very friable; common roots; very strongly acid; clear, smooth boundary.

A2—13 to 28 inches, yellowish-brown (10YR 5/4) loamy sand; very weak, fine, subangular blocky structure; very friable; common roots; very strongly acid; clear, wavy boundary.

B2t—28 to 34 inches, brown or dark-brown (7.5YR 4/4) sandy loam; weak, fine, subangular blocky structure; friable, slightly sticky; few roots; sand grains are filmed and bridged with clay; very strongly acid; clear, wavy boundary.

C—34 to 72 inches, light yellowish-brown (10YR 6/4) sand, thin (⅛-inch horizontal bands of brown or dark-brown (7.5YR 4/4) sandy loam at intervals of about 4 inches; single grain; loose; a few weathered quartz pebbles as much as 1 inch in diameter; strongly acid.

Hue in the A horizon generally is 10YR, but ranges to 7.5YR. The value ranges from 4 to 6 and the chroma from 2 to 6. The lowest value and chroma is limited to the Ap horizon or to thin, undisturbed A1 horizons. The A horizon ranges from 20 to 40 inches in thickness.

The hue in the B horizon centers on 7.5YR but includes 10YR and approaches 5YR. The value is 4 or 5, and the chroma ranges from 4 to 8. The Bt horizon is 10 to 15 percent clay. Clay films in the Bt horizon are few, thin, and difficult to identify.

The C horizon generally is one unit yellower in hue than the B horizon, and frequently has a higher value. The texture of the C horizon is sand or loamy sand.

Typically the solum is less than 40 inches thick, which is outside the defined range for the series. In places there are some fine, smooth pebbles in the profile.

In many respects, Fort Mott soils are intermediate between Evesboro and Sassafras soils, and they are commonly associated with them. Fort Mott soils are not so sandy as the Evesboro soils, and they have a Bt horizon of sandy loam that is lacking in Evesboro soils. Fort Mott soils have a thicker, sandier A horizon than Sassafras soils and a thinner, less clayey B horizon.

Fort Mott loamy sand, 0 to 5 percent slopes (FtB).—This is only Fort Mott soil mapped in the county. Included in mapping are areas that have slopes of more than 5 percent. In other small areas, erosion and soil blowing have removed some of the surface layer, and the remaining loamy sand surface layer is less than 20 inches thick.

This soil is suited to cultivated crops, especially early truck crops, but it is seldom used for hay or pasture. Large amounts of fertilizer are needed for crops, and supplementary irrigation needs to be quickly available during periods of little rainfall. This soil is well suited to early planted flowering annuals and similar plants. Capability unit IIs–4; woodland subclass 3o.

Galestown Series

The Galestown series consists of very deep, somewhat excessively drained, level to moderately sloping very sandy soils on uplands of the Coastal Plain. These are the most sandy soils in the county, and in places they have the appearance of low dunes. They formed in old marine deposits of sand and have been at least partly reworked by wind. The native vegetation is scrub oaks and other hardwoods. In places areas that were once cleared now are in Virginia pine.

In a representative profile the surface layer is brown to very dark brown loamy sand about 6 inches thick. The upper part of the subsoil is brown or dark-brown loamy sand about 14 inches thick. The lower part of the subsoil, about 13 inches thick, is reddish-brown loamy sand that is very slightly sticky because it contains clay. The underlying material is reddish-brown loose sand to a depth of at least 72 inches.

Galestown soils are strongly acid to very strongly acid but are easy to work. They warm quickly in spring, and are similar to Fort Mott soils in that they are ready for planting earlier than other soils in the county. The main factors limiting use are low available moisture capacity, rapid to very rapid permeability, and loose sand. Loose dry surfaces are subject to soil blowing. Erosion by water is a minor problem.

Representative profile of Galestown loamy sand, 0 to 5 percent slopes, in a wooded area on Stumps Road, one-half mile north of Ebenezer Road:

A1—0 to 2 inches, very dark brown (10YR 2/2) loamy sand; weak, medium, granular structure; very friable; common roots; very strongly acid; clear, wavy boundary.

A2—2 to 6 inches, brown (10YR 5/3) loamy sand; weak, medium, granular structure; very friable; common roots; very strongly acid; gradual, wavy boundary.

B1—6 to 20 inches, brown or dark-brown (7.5YR 4/4) loamy sand; weak, medium, granular structure; loose to very friable; common roots; many sand grains are filmed and bridged with clay; very strongly acid; diffuse boundary.

B2t—20 to 33 inches, reddish-brown (5YR 4/4) loamy sand; very weak, fine, blocky structure; very friable, very slightly sticky; common roots; sand grains filmed; evidence of clay bridging; some fragments of ferruginous sandstone (ironstone); very strongly acid; diffuse boundary.

C—33 to 72 inches, reddish-brown (5YR 5/3) sand, some thin (½ inch) strata or bands of loamy sand; single grain; loose; very few roots; very strongly acid.

In the A horizon the hue is 10YR or 7.5YR, the value ranges from 2 to 5, and the chroma from 1 to 4. The values of

2 and 3 and chroma of 1 are limited to undisturbed A1 horizons less than 6 inches thick.

The B horizon is mostly 7.5YR in hue but ranges to 5YR in places. The value ranges from 4 to 6 and the chroma from 4 to 8. Texture of the B horizon generally is loamy sand, but the horizon is sand in places. In some profiles a transitional B3 horizon is between the B2t and C horizons.

The C horizon generally is yellower and has higher values and lower chromas than the B horizon. Thus the C horizon described in the representative profile is somewhat redder than generally is typical for the series. The thin bands of loamy sand described in the C horizon are genetically similar to material in the B horizon. In many profiles these bands are lacking.

The solum ranges from about 27 to 40 inches in thickness. The profile generally is free of gravel, but in places the B and C horizons contain thin layers of ferruginous sandstone or ironstone.

Galestown soils do not closely resemble any other soils of Baltimore County. They are the only classified genetic soils in the county that are coarse textured throughout.

Galestown loamy sand, 0 to 5 percent slopes (GaB).—This soil has the profile described as representative of the series. Included in mapping are a few acres where finer material has been deposited on and mixed with the surface layer.

This soil is especially suited to early truck crops, but ought to have supplementary irrigation available. Because of low fertility and seasonal droughtiness, the choice of crops is restricted. This soil is seldom used for hay crops or pasture. Capability unit IIIs-1; woodland subclass 3s.

Galestown loamy sand, 5 to 10 percent slopes (GaC).—This soil is more droughty than Galestown loamy sand, 0 to 5 percent slopes, and the choice of crops is even more restricted. Included in mapping are a number of acres that have slopes of more than 10 percent. Some areas have lost the surface layer and even a part of the subsoil, probably by soil blowing.

Little of the soil is used for cultivated crops, and practically none of it is used for hay or pasture. The soil is better suited to early truck crops and orchards than to other uses. Capability unit IVs-1; woodland subclass 3s.

Glenelg Series

The Glenelg series consists of deep, well-drained, gently sloping to strongly sloping soils on uplands of the Piedmont Plateau. These soils formed in material that weathered in place mainly from such acid crystalline rocks as mica schist. They are the most extensive and important soils for farming in the county. The native vegetation is mixed hardwoods, mainly oaks. Large areas have been cleared.

In a representative profile the surface layer is dark yellowish-brown loam about 7 inches thick. The subsoil is about 18 inches thick. It is strong-brown light silty clay loam in the upper part and yellowish-red light clay loam in the lower part. This material is somewhat sticky and plastic when wet. Underlying the subsoil is banded yellowish-red, dark yellowish-brown, and yellowish-brown loam derived from disintegrated rock material overlying bedrock.

The Glenelg soils are strongly acid or very strongly acid and are fairly easy to work. In spring they warm soon enough for all normal farming operations. Permeability is moderate, and the available moisture capacity is moderate to high. These soils are used for practically all purposes. Slope and the hazard of erosion are the main limitations to use.

Representative profile of Glenelg loam, 3 to 8 percent slopes, moderately eroded, in a white pine plantation about 200 feet south of Beckleysville Road and three-fourths mile northeast of Beckleysville:

Ap—0 to 7 inches, dark yellowish-brown (10YR 4/4) loam; moderate, fine, granular structure; very friable, slightly sticky; many roots; very strongly acid; clear, smooth boundary.

B2t—7 to 20 inches, strong-brown (7.5YR 5/6) light silty clay loam; weak, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; distinct clay films; some mica flakes; strongly acid; clear, wavy boundary.

B3—20 to 25 inches, yellowish-red (5YR 4/6) light clay loam; weak, medium, subangular blocky structure; friable; slightly sticky and slightly plastic; common roots; few mica flakes and soft schist fragments; strongly acid; gradual, wavy boundary.

C—25 to 80 inches, banded yellowish-red (5YR 4/6) dark yellowish-brown (10YR 3/4), and yellowish-brown (10YR 5/8) loam; massive with inherent rock structure; soft, loose; a few roots in upper part; some soft schist fragments and angular quartzite gravel; strongly acid.

The A horizon generally is 10YR in hue, but in places it is 7.5YR; value ranges from 3 to 5 and chroma from 1 to 4. The lowest value and chroma are limited to A1 horizons less than 6 inches thick. The texture is loam or gravelly loam, and the silt content is nearly 50 percent.

In the Bt horizon the hue generally is 7.5YR, but in some places it is 10YR, and in others it ranges to 5YR. The value is 4 or 5, and the chroma ranges from 6 to 8. The Bt horizon is loam, silt loam, or silty clay loam that is 25 to 35 percent clay.

The C horizon generally is more than 3 feet thick, but it is thinner in places where the profile contains many coarse fragments. This horizon is always micaceous. It generally is variegated, but it lacks gray colors.

The solum ranges from about 18 to 30 inches in thickness. Depth to bedrock ranges from about 4 to 10 feet or more. The solum is as much as 20 percent gravel, which is mostly hard, white, angular quartzite. Vertical injections of quartzite, 4 to 10 inches thick, are at widely but irregularly spaced intervals in undisturbed parts of the solum and in the C horizon.

Glenelg soils are similar to Chester, Elsinboro, Edgemont, and Sassafras soils, but they are more micaceous than any of those soils. They have a finer textured B horizon than the closely associated Manor soils. Glenelg soils are similar to Hollinger soils, but they are more strongly acid.

Glenelg loam, 3 to 8 percent slopes, moderately eroded (GcB2).—This soil has the profile described as representative of the series. Included in mapping are a large number of small, nearly level soils and some widely scattered areas of soils that are severely eroded.

This soil is well suited to cultivated crops, pasture, and trees, and to most nonfarm uses. The hazard of further erosion is the chief limitation to use. The hazard of further erosion is slight in wooded areas. Capability unit IIe-4; woodland subclass 2o.

Glenelg loam, 8 to 15 percent slopes, moderately eroded (GcC2).—This soil is well suited to farming and to most other uses. The hazard of further erosion is severe in cultivated areas unless appropriate erosion-control measures are applied and maintained. Capability unit IIIe-4; woodland subclass 2o.

Glenelg loam, 8 to 15 percent slopes, severely eroded (GcC3).—This soil has a browner surface layer than that in the profile described as representative of the series

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The subsoil is exposed in many places, and it is thinner than that in less eroded Glenelg soils. Many gullies cut the areas, and the hazard of further erosion is severe. Cultivated crops ought to be grown only at infrequent intervals, and a protective cover of hay, pasture, or other plants should be kept on the soil. In addition other erosion control measures ought to be intensively applied and maintained. Capability unit IVe 3; woodland subclass 2o.

Glenelg loam, 15 to 25 percent slopes, moderately eroded (GcD2).—This soil has a thin surface layer. The subsoil is thinner and depth to bedrock is less than that in less sloping Glenelg soils.

Much of this soil has been kept in trees or under other protective cover. Further erosion is a very severe hazard if clean-tilled crops are grown. The soil is suited to pasture and trees, but cultivated crops can be grown only at infrequent intervals. A protective cover of vegetation should be kept on the soil most of the time. Capability unit IVe-3; woodland subclass 2r.

Glenelg loam, 15 to 25 percent slopes, severely eroded (GcD3).—This soil has lost most of its surface layer and much of its subsoil through erosion. Many gullies cut the areas. This soil is not suited to cultivated crops, but it is suited to hay, pasture, and trees. Some areas are suited to sodded orchards. Capability unit VIe–3; woodland subclass 2r.

Glenelg channery loam, 3 to 8 percent slopes, moderately eroded (GgB2).—The profile of this soil is similar to the one described as representative of the series, except that many flat fragments of mica schist as much as 6 inches long occur throughout the profile. These fragments make up 15 to 20 percent of the surface layer, and they generally are more abundant as depth increases. The fragments are abrasive to farm implements, but they help to retard soil loss through erosion. The profile also contains some hard quartzite gravel. Included in mapping are a few areas that are severely eroded.

The soil is suited to crops, pasture, and trees. The hazard of further erosion is moderate. Capability unit IIe–4; woodland subclass 2o.

Glenelg channery loam, 8 to 15 percent slopes, moderately eroded (GgC2). -This soil has more flat fragments of schist on the surface than the less sloping Glenelg channery loam. Included in mapping are some widely scattered areas that are severely eroded.

Under good management that includes measures for the control of further erosion, this soil is suited to cultivated crops, pasture, and trees. Capability unit IIIe–4; woodland subclass 2o.

Glenelg channery loam, 15 to 25 percent slopes, moderately eroded (GgD2).—This steep soil has enough flat rock fragments throughout the profile to retard soil loss. Most of the soil has been kept in trees, and areas that have been cleared have been well protected. This soil is suited to an occasional cultivated crop and to pasture and trees. Capability unit IVe–3; woodland subclass 2r.

Glenelg channery loam, 15 to 25 percent slopes, severely eroded (GgD3).—This soil has lost most of the fine material formerly in its surface layer and part of its subsoil through erosion. Many gullies cut the areas. The surface of the soil generally is covered by fragments of schist, and the gullies are at least partly filled by such fragments.

This soil is not suited to cultivated crops. It is suited to hay, pasture, trees, or sodded orchards. Capability unit VIe–3; woodland subclass 2r.

Glenelg-Urban land complex, 0 to 8 percent slopes (GlB).—This complex consists of soils of the Glenelg series, most of which have been cut, filled, graded, or otherwise disturbed for nonfarm uses. These soils are mostly on the Piedmont Plateau close to Baltimore or in other built-up areas.

Included with these soils in mapping are small areas that have a thicker subsoil than is typical of Glenelg soils. Also included are small areas where the subsoil is thinner than typical of Glenelg soils.

In about 50 percent of the area of this complex, the soils are relatively undisturbed. In about 30 percent of the complex, the soils have been covered by as much as 18 inches of fill material, or they have had as much as two-thirds of the original profile removed by grading or cutting. The remaining 20 percent of the complex is Urban land, where the soils have been covered by fill material to a depth of more than 18 inches, or most of the profile or all of it has been cut away. The fill material is variable, but it generally is from adjacent areas of Glenelg soils or related soils that have been cut or graded. Streets, sidewalks, and buildings make up a large part of the complex.

Internal drainage is good on this complex, except where it has been modified by man. The areas generally are good for foundations and footings, and they are satisfactory for basements and other excavations. The soil materials and most fill materials are suitable for lawns, ornamental shrubs, and other vegetation. In deeper cuts, the suitability of the soil materials for vegetation must be determined locally at each site. Capability unit and woodland subclass not assigned.

Glenelg-Urban land complex, 8 to 15 percent slopes (GlC).—This complex consists of moderately sloping Glenelg soils that have been used for residential or other nonfarm uses. Included in mapping are many areas where the subsoil is lighter in texture and more readily permeable than that of typical Glenelg soils.

In about 30 percent of the area of this complex, the soils are relatively undisturbed. In about 40 percent of the complex, the soils have been covered by as much as 18 inches of fill material, or they have had as much as two-thirds of the original profile removed by cutting or grading. The remaining 30 percent of the complex is Urban land, where the soils have been covered by fill material to a depth of more than 18 inches, or most of the profile or all of it has been graded away. The fill material is variable, but it generally is fram adjacent areas of Glenelg soils that have been cut or graded. Streets, sidewalks, and buildings make up part of the complex.

Internal drainage is good on this complex except where it has been modified by man. The areas generally are good for foundations and footings, and they are satisfactory for basements or other shallow excavations. The soil materials and most fill materials are fairly suitable for lawns, ornamental shrubs, and other vegetation. In deeper cuts, the suitability of the soil ma-

terials for vegetation must be determined locally at each site. Capability unit and woodland subclass not assigned.

Glenville Series

The Glenville series consists of deep, moderately well drained to somewhat poorly drained, nearly level to gently sloping acid soils that have a fragipan. These soils are on the Piedmont Plateau. They are on flats, in depressions, at the foot of hillsides, and around the heads of drains. They formed mostly in material weathered in place from underlying micaceous rocks, but in some places the upper part of the soil profile formed in local alluvium. The native vegetation is water-tolerant hardwoods.

In a representative profile the surface layer is brown or dark-brown silt loam about 10 inches thick. The upper part of the subsoil, about 16 inches thick, is yellowish-brown silt loam or silty clay loam that is mottled with grayish brown and other colors in the lower part. The lower part of the subsoil, about 21 inches thick, is the fragipan. It is firm, brittle, and dense, and water moves slowly through it. This layer is brown to grayish-brown, mottled with other colors. The underlying material is grayish-brown, strong-brown, and dark yellowish-brown loam derived from disintegrated rock. It is characteristically very micaceous.

Glenville soils are fairly easy to work at a favorable moisture content. They are wet in spring and slow to warm, so planting frequently is delayed. These soils have a moderate available moisture capacity but permeability is moderately slow because of the fragipan. They are limited for many uses by seasonal wetness, impeded drainage, moderately slow movement of water through the lower part of the subsoil, restricted depth of the root zone, and in sloping areas by the hazard of erosion.

Representative profile of Glenville silt loam, 3 to 8 percent slopes, in a formerly cultivated area 1½ miles east of Texas:

Ap—0 to 10 inches, brown or dark-brown (10YR 4/3) silt loam; moderate, fine to medium, granular structure; very friable; common roots; medium acid; abrupt, smooth boundary.

B21t—10 to 16 inches, yellowish-brown (10YR 5/4) heavy silt loam; weak, medium, blocky structure; firm, slightly sticky; common roots; thin, discontinuous clay films; medium acid; clear, wavy boundary.

B22t—16 to 26 inches, yellowish-brown (10YR 5/6) silty clay loam; common, medium, distinct mottles of grayish-brown (10YR 5/2) and strong brown (7.5YR 5/8); moderate, fine and medium, subangular blocky structure; firm, sticky and plastic; common roots; brown (7.5YR 5/2) discontinuous clay films; medium acid; gradual, wavy boundary.

Bx1 26 to 34 inches, grayish-brown (10YR 5/2) light silty clay loam; many, coarse, distinct mottles of strong brown (7.5YR 5/6); moderate, coarse, blocky and thin, platy structure; firm, brittle, sticky and slightly plastic; few roots; brown (7.5YR 5/2) discontinuous clay films; strongly acid; clear, smooth boundary.

Bx2—34 to 47 inches, brown (7.5YR 5/2) silt loam, many, coarse, distinct mottles of gray or light gray (10YR 6/1) and medium prominent mottles of strong brown (7.5YR 5/6); weak, coarse, blocky and thin, platy structure; very firm, slightly sticky and slightly plastic; discontinuous clay films; micaceous; very strongly acid; clear, wavy boundary.

C 47 to 72 inches, variegated grayish-brown (10YR 5/2), strong-brown (7.5YR 5/6), and dark yellowish-brown (10YR 4/4) loam; massive, shows inherent rock structure; friable; very micaceous; very strongly acid.

Hue throughout the profile is mostly 10YR but ranges to 7.5YR in some B horizons.

In the A horizon, the value ranges from 3 to 6 and the chroma from 1 to 4. The value of 3 and chroma of 1 are limited to undisturbed A1 horizons less than 6 inches thick, and values of 5 and 6 are limited to undisturbed A2 horizons.

In the Bt horizon both value and chroma of the matrix range from 4 to 6. The upper, unmottled part of this horizon is less than 10 inches thick. The lower part always has mottling with chroma of 2 or less and has high-chroma mottling in places. The Bt horizon ranges from heavy loam or silt loam to silty clay loam. It is 20 to 30 percent clay.

In the Bx horizon matrix colors are similar to those in the Bt horizon, but chroma is as low as 2 or 3. The Bx horizon generally has more low and high-chroma mottles than the mottled part of the Bt horizon. The Bx horizon has the same textural range as the Bt horizon, but the clay content of the Bx averages less than that of the Bt horizon and generally decreases with depth.

The C horizon is more friable, more micaceous, and coarser in texture than the Bt and Bx horizons.

The solum ranges from about 30 to 48 inches in thickness. Depth to bedrock ranges from about 4 to 10 feet. Small amounts of quartzite gravel are present in the solum or C horizon, and weathered schist fragments are in the C horizon in places.

Glenville soils resemble Aldino, Beltsville, and Captina soils somewhat but are less well aerated and are wetter seasonally. They are shallower to bedrock than Beltsville soils, less silty than Aldino and Captina soils, and more strongly acid and micaceous than Aldino soils. Glenville soils generally are associated with poorly drained Baile soils.

Glenville silt loam, 0 to 3 percent slopes (GnA).—The profile of this soil is similar to that described as representative of the series, but in many places it has a thicker surface layer. Included in mapping are a few eroded spots.

The main limitations to use are seasonal wetness and impeded natural drainage. Artificial drainage is needed for most crops. The soil is suited to cultivation but the choice of crops is limited because the fragipan restricts root penetration. Herbaceous perennials such as alfalfa are subject to damage by frost heaving on this soil. Erosion generally is not a serious hazard. Capability unit IIw–1; woodland subclass 2w.

Glenville silt loam, 3 to 8 percent slopes (GnB).—This soil has the profile described as representative of the series. It is mostly in small areas in all parts of the Piedmont Plateau where soils have formed over acid micaceous rocks. Included in mapping are some eroded spots and some small areas of soils that slope more than 8 percent.

The soil is suited to some cultivated crops and to pasture and trees. The hazard of erosion generally is a more important management concern than impeded drainage, though in places artificial drainage is needed for some crops. Capability unit IIe 16; woodland subclass 2w.

Glenville-Urban land complex, 0 to 8 percent slopes (GuB).—This complex consists of soils of the Glenville series, most of which have been cut, filled, graded, or otherwise disturbed for residential or other nonfarm uses. Included in mapping are a few areas of soil that slope more than 8 percent.

In about 35 percent of the area of this complex the soils are undisturbed. In about 50 percent of the complex, the soils have been covered by as much as 18 inches

of borrow material or other fill, or they have had as much as two-thirds of the original profile removed by cutting or grading. The remaining 15 percent of the complex is Urban land, where the soil has been covered by more than 18 inches of fill, or the profile has been almost entirely or entirely cut away. The fill materials are mostly of local origin and generally are silty and micaceous. Streets, sidewalks, and buildings make up a large part of the complex.

Seasonal wetness and a high water table limit the suitability of this complex for building sites, septic tanks, and other residential and community uses. The soils and fill materials make a fairly good medium for lawn grasses, ornamental shrubs, and other plants that can tolerate some seasonal wetness. There is a hazard of frost heaving to some perennials. Suitability of soils in deeply filled or cut areas must be determined for each site. Capability unit and woodland subclass not assigned.

Hagerstown Series

The Hagerstown series consists of very deep, well-drained, nearly level to moderately sloping soils of the limestone valleys on the Piedmont Plateau. These soils formed in materials deeply weathered in place from fairly pure limestone and marble. The native vegetation is mixed hardwoods including black walnut, but few, if any, wooded areas remain.

In a representative profile the surface layer is reddish-brown silt loam about 9 inches thick. The upper part of the subsoil is yellowish-red sticky silty clay loam about six inches thick. The lower part of the subsoil, about 39 inches thick, is red clay that is plastic and very sticky. The underlying material, to a depth of about 80 inches, is massive, strong-brown clay loam streaked with red.

Hagerstown soils are fairly easy to work at a favorable moisture content. They generally are no more than slightly acid, have a high available moisture capacity, and a high natural content of plant nutrients. Permeability is moderate. These soils have no limitations to farming except for the erosion hazard in sloping areas. The only important limitation to most nonfarm uses is slope.

Representative profile of Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated area on the north side of Shawan Road, one-fourth mile west of its intersection with Interstate Route 83:

Ap—0 to 9 inches, reddish-brown (5YR 4/4) silt loam; weak, medium, granular structure; friable, slightly sticky; many roots; some subangular quartz gravel; moderately alkaline; abrupt, smooth boundary.

B1—9 to 15 inches, yellowish-red (5YR 4/6) silty clay loam; weak to moderate, fine, subangular blocky structure; firm, sticky and plastic; common roots; moderately alkaline; clear, wavy boundary.

B21t—15 to 25 inches, red (2.5YR 4/6) clay; moderate, medium, subangular blocky structure; very firm, plastic and very sticky; few roots; faint clay films; neutral; gradual, wavy boundary.

B22t—25 to 54 inches, red (2.5YR 4/8) clay; moderate, fine, subangular blocky structure; firm, plastic and very sticky; a few roots in upper part; distinct clay films; slightly acid; gradual, wavy boundary.

C—54 to 80 inches, strong-brown (7.5YR 5/8) heavy clay loam, banded with red (2.5YR 5/8) in upper part; massive; firm, sticky and plastic; some weathered limestone fragments; medium to strongly acid.

In the A horizon color ranges from 10YR to 5YR in hue, from 3 to 5 in value, and from 1 to 4 in chroma. The lowest value and chroma are limited to undisturbed A1 horizons less than 6 inches thick.

In the B horizon, the hue ranges from 2.5YR to 7.5YR, the value is 4 or 5, and the chroma ranges from 4 to 8. The texture of the Bt horizon generally is clay or silty clay but is silty clay loam in places. The weighted average content of clay in the Bt horizon ranges from 45 to 60 percent.

In the C horizon the hue ranges from 10YR to 2.5YR, the value from 3 to 6, and the chroma from 4 to 8. This horizon is uniform in color in some areas and moderately or highly variegated in others.

The solum ranges from about 40 to 60 inches in thickness. Depth to bedrock (fig. 6) ranges from about 4 to 7 feet. Small amounts of cherty gravel are in the profile, and iron-manganese concretions and geodes are fairly common in the lower part of the B and the C horizon. There are some major outcroppings of hard limestone.

Hagerstown soils are similar to Christiana, Elioak, Sunnyside, and Montalto soils in color and drainage. Hagerstown soils are less acid and contain more plant nutrients than Christiana, Sunnyside, and Elioak soils. They formed in residuum from fairly pure limestone, whereas the Montalto soils formed in residuum from dark, basic igneous rocks and contain coarse fragments of those rocks. Hagerstown soils are more clayey and less sandy throughout than Sunnyside soils.

Hagerstown silt loam, 0 to 3 percent slopes (HaA).—This soil has a profile similar to that described as representative of the series except that the surface layer generally is thicker. Included in mapping are some areas that have some surface gravel and some spots where the surface layer has been washed away.

This soil can be used for most purposes if it is reasonably well managed. Capability unit I–1; woodland subclass 1c.

Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded (HaB2).—This soil has the profile described as representative of the series. Included in mapping are a few severely eroded spots and some gravelly areas. The soil is well suited to most uses and has only moderate limitations because of slope and the hazard of further erosion. Capability unit IIe–1; woodland subclass 1c.

Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded (HaC2).—This soil generally has a thinner surface layer than that in the profile described as representative of the series. Included in mapping are some spots that are severely eroded and some that have slopes of more than 15 percent. Also included are some gravelly areas and some outcroppings of hard rock that are shown on the soil map by a conventional symbol.

The hazard of further erosion is severe because of slope, but under good management that includes erosion-control practices, the soil can be used continuously for nearly all purposes. Capability unit IIIe–1; woodland subclass 1c.

Hatboro Series

The Hatboro series consists of deep, poorly drained, nearly level soils on flood plains, mainly on the Piedmont Plateau. These soils extend along the major streams into the upper part of the Coastal Plain. The water table is at or near the surface for long periods, and the soils are subject to flooding at irregular intervals. The native vegetation is wetland oaks, maple, holly, and sweetgum.

In a representative profile the surface layer is black

Figure 6.—**Hard limestone under Hagerstown silt loam in new road cut.**

silt loam about 5 inches thick. The upper part of the subsoil, about 9 inches thick, is gray silt loam that is mottled with strong brown. The lower part of the subsoil, about 29 inches thick, is gray or light-gray mottled sticky silt loam. The underlying material is greenish-gray, mottled loam that is very micaceous.

The Hatboro soils are neutral to very strongly acid above a depth of 43 inches, and they are medium acid to slightly acid below this detph. They have a high available moisture capacity. Hatboro soils are fairly easy to work at a favorable moisture content, but they generally are wet late in spring and are slow to warm. Plowing and planting are usually delayed. Artificial drainage is needed for nearly all uses. Because of moderate permeability water moves through the soil readily, and these soils are fairly easy to drain where adequate outlets exist.

Representative profile of Hatboro silt loam, in wooded area west of Bonita Avenue, 1½ miles north of Reisterstown Road:

A1—0 to 5 inches, black (10YR 2/1) silt loam; weak, medium, granular structure; friable, slightly sticky and slightly plastic; many roots; a few, fine, dark-red (2.5YR 3/6) inclusions; medium acid; abrupt, smooth boundary.

B1g—5 to 14 inches, gray (10YR 5/1) silt loam; many, fine, prominent mottles of strong brown (7.5YR 5/8); weak, fine, subangular blocky structure; friable, slightly sticky; many roots; very strongly acid; gradual, smooth boundary.

B2g—14 to 43 inches, gray or light-gray (10YR 6/1) heavy silt loam; many, medium, prominent mottles of strong brown (7.5YR 5/8); very weak, medium, subangular blocky structure to massive; firm, sticky and slightly plastic; common roots in upper part, few roots in lower part; yellowish-red (5YR 5/8) linings in old root channels; strongly acid to very strongly acid; clear to abrupt, smooth boundary.

IICg—43 to 60 inches, greenish-gray (5BG 5/1) loam; few, fine, prominent mottles of yellowish-brown (10YR 5/8); massive; friable; many mica flakes; medium acid.

The hue in the solum is 10YR or yellower, but color is neutral in places. Beneath the solum the color generally is neutral, but ranges to 5B or 5GB in hue. In some undisturbed areas, the A1 horizon is dark gray or black. The Ap horizon has a value of 4 or 5, and chroma ranges from 1 to 3. In the B horizon value ranges from 4 to 7 and chroma from 0 to 2. The mottles in the B horizon are redder in hue than in the matrix, and they have a value of 4 or 5 and chroma ranging from 4 to 8.

The C horizon is unconforming and is abruptly either finer or coarser in texture than the solum. It is similar to the B horizon in color except that in places the matrix hue is greener, bluer, or both.

The solum ranges from about 40 to 60 inches in thickness. Depth to bedrock generally ranges from 6 to more than 20 feet. Waterworn pebbles are throughout the profile, but generally they are not abundant except in the IICg horizon. Differences in texture between horizons are the result of sedimentation and stratification rather than accumulation of clay by illuviation.

Hatboro soils are similar in color to Baile soils that have well-developed horizons of accumulated clay. They are closely associated with the well-drained Comus soils and the moderately well drained to somewhat poorly drained Codorus soils. Hatboro soils are less silty but are more micaceous than Melvin soils, and they are more strongly acid.

Hatboro silt loam (Hb).—This nearly level soil is the only Hatboro soil mapped in the county. It is on small flood plains and on the lower and wetter parts of larger flood plains. In a few areas slope is more than 3 percent. A few acres have been filled or otherwise disturbed for nonfarm uses.

If drained, this soil is suited to farming. The principal uses are for corn or pasture. Uncleared areas support good stands of hardwood. Capability unit IIIw–7; woodland subclass 2w.

Hollinger Series

The Hollinger series consists of deep, well-drained, gently sloping to moderately steep soils on uplands of the Piedmont Plateau. These soils formed in materials weathered in place from micaceous limestone or calciferous schist. The native vegetation is mixed upland hardwoods dominated by oaks and hickory.

In a representative profile the surface layer is brown or dark-brown loam about 9 inches thick. The upper part of the subsoil, about 7 inches thick, is dark yellowish-brown loam or silt loam. The lower part of the subsoil, about 15 inches thick, is brown or dark-brown silt loam and strong-brown loam. The underlying material is yellowish-red sandy loam and pale-yellow sand derived from disintegrated rock (fig. 7).

Figure 7.—**This cut through Hollinger loam near Cockeysville shows underlying calcareous sand that is being mined for use in construction work.**

Hollinger soils are easy to work except where they are rocky. They generally are neutral in reaction throughout, and they have moderate to high available moisture capacity. They are moderately permeable. The main limitations to nearly all uses are those imposed by slope, erosion hazard, and rockiness.

Representative profile of Hollinger loam, 8 to 15 percent slopes, moderately eroded, in an idle area on the north side of Beaver Dam Road, about one-half mile west of Cockeysville:

Ap—0 to 9 inches, brown or dark-brown (10YR 4/3) loam; strong, medium, granular structure; loose; few roots; some mica flakes and fine angular quartzite gravel; neutral; clear, smooth boundary.

B1—9 to 16 inches, dark yellowish-brown (10YR 4/4) loam or silt loam; weak, medium, blocky structure; friable, slightly sticky; few roots; some mica flakes and fine angular quartzite gravel; neutral; clear, wavy boundary.

B2t—16 to 25 inches, brown or dark-brown (7.5YR 4/4) silt loam; weak, medium, blocky structure; friable to firm, slightly sticky; few roots; thin, discontinuous clay films; some mica flakes and fine angular quartzite gravel; neutral; gradual, wavy boundary.

B3—25 to 31 inches, strong-brown (7.5YR 5/6) loam; weak, very coarse, blocky structure; friable to firm, slightly sticky; some mica flakes and fine angular quartzite gravel; neutral; gradual, wavy boundary.

C1—31 to 88 inches, yellowish-red (5YR 4/8) sandy loam; massive, inherent rock structure evident; friable; some mica flakes and fine angular quartzite gravel; neutral; abrupt irregular boundary.

C2—88 to 108 inches, pale-yellow (2.5YR 8/4) sand; single grain to massive; friable to firm; some fissured hard impure limestone ledges; calcareous and moderately alkaline.

In the A horizon, color value ranges from 3 to 5 and chroma from 1 to 4. The lowest value and chroma are limited to undisturbed A1 horizons less than 6 inches thick.

In the B horizon the hue is 10YR or 7.5YR, value ranges from 4 to 6, and chroma ranges from 4 to 8. The B horizon is only slightly finer in texture than the A horizon. It contains slightly more clay and in places slightly more silt. The Bt horizon is 18 to 25 percent clay.

The C horizon is more variable in color than the B horizon and is coarser in texture. Part of the C horizon is calcareous and effervesces when it is treated with dilute hydrochloric acid.

The solum ranges from about 24 to 34 inches in thickness. Depth to bedrock ranges from 4 feet to more than 8 feet. These soils are less than 20 percent hard gravel. Some areas are stony, and outcroppings of hard rock are in places.

Hollinger soils are similar to Conestoga and Glenelg soils in color and drainage. Hollinger soils have a thinner and less clayey Bt horizon than Conestoga soils. Hollinger soils are neutral in reaction, but Glenelg soils are strongly acid and contain smaller amounts of natural plant nutrients than Hollinger soils.

Hollinger loam, 3 to 8 percent slopes, moderately eroded (HoB2).—This soil has a profile similar to the one described as representative of the series except the surface layer and the subsoil generally are slightly thicker. Included in mapping are a few small areas that have a gravelly surface layer.

The soil is well suited to cultivated crops, pasture, and trees. The hazard of further erosion is moderate. Capability unit IIe–25; woodland subclass 2o.

Hollinger loam, 8 to 15 percent slopes, moderately eroded (HoC2).—This soil has the profile described as representative of the series. Included in mapping are some gravelly areas and some scattered small areas that are severely eroded. A few acres have been graded or otherwise disturbed for nonfarm uses.

The hazard of further erosion is severe, but if appropriate erosion-control measures are used, the soil is suited to cultivated crops and to pasture and trees. Capability unit IIIe–25; woodland subclass 2r.

Hollinger and Conestoga loams, 15 to 25 percent slopes, severely eroded (HrD3).—Mapped areas of this unit consist of either Hollinger loam or Conestoga loam or both. These severely eroded soils are similar, are used mostly for the same purposes, and require similar management. More than half of the total area is Hollinger loam, and less than half is Conestoga loam. Included in mapping are small areas of soils that are not severely eroded and areas where slope is more than 25 percent. In most areas the present surface layer is former subsoil that has been exposed by erosion or is subsoil material that has been turned up by plowing. Many gullies cut the areas.

The soils generally are unsuited to cultivation but can be used for hay, pasture, and trees. Capability unit VIe–3; woodland subclass 2r.

Hollinger and Conestoga very rocky loams, 3 to 15 percent slopes (HsC).—The soils of this mapping unit have profiles similar to either Hollinger loam or Conestoga loam. Exposures of hard rock make tillage impracticable. These exposures are about 30 to 100 feet apart, and they cover 10 to 25 percent of the surface, depending upon pattern. A few acres have slopes of more than 15 percent.

These soils are suited to hay crops or improved pasture in areas that are not too rough for mowing equipment. Capability unit VIs–2; woodland subclass 2r.

Iuka Series

The Iuka series consists of deep, moderately well drained, very strongly acid to extremely acid, nearly level soils on flood plains of streams on the Coastal Plain. These soils formed in recently deposited alluvium that was originally washed from upland soils of the same Coastal Plain area. The native vegetation is mixed water-tolerant hardwoods, including many willow oaks.

In a representative profile the surface layer is silt loam about 10 inches thick. The upper part of the surface layer is dark brown and the lower part is yellowish brown. The subsoil, about 31 inches thick, is yellowish-brown and dark yellowish-brown silt loam that is mottled or streaked with gray and other colors. The underlying material is yellowish-red, loose, coarse sandy loam.

Iuka soils are easy to work at a favorable moisture content, but they stay wet until late in spring and are rather slow to warm. They are also subject to irregular flooding. They have moderate available moisture capacity. The permeability is moderate. Seasonal wetness, impeded drainage, and the hazard of flooding moderately to severely limit their use for nearly all purposes.

Representative profile of Iuka silt loam, in a wooded area about 200 feet south of Babikow Road, midway between Interstate 95 and Route 7:

A11—0 to 4 inches, dark-brown (10YR 3/3) silt loam; weak, fine, granular structure; loose to very friable, slightly

sticky; many roots; very strongly acid; clear, irregular boundary.

A12—4 to 10 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, granular structure; loose to very friable; common roots; very strongly acid; clear, wavy boundary.

C1—10 to 26 inches, dark yellowish-brown (10YR 4/4) silt loam; common, medium, distinct mottles of light brownish-gray (10YR 6/2) and common, medium, prominent mottles of strong brown (7.5YR 5/8); massive; very friable; common roots; very strongly acid; clear, wavy boundary.

C2—26 to 41 inches, yellowish-brown (10YR 5/6) silt loam, very thin vertical streaks of light gray (10YR 7/2), 4 to 5 inches apart; massive; firm; common roots; some thin lenses of fine and very fine sand; extremely acid; abrupt, wavy boundary.

IIC3—41 to 60 inches, yellowish-red (5YR 4/8) coarse sandy loam; single grain; loose; some waterworn quartz gravel; very strongly acid.

In the A horizon hue is 10YR or 7.5YR, value ranges from 3 to 6, and the chroma ranges from 2 to 4. The value of 3 is limited to horizons less than 6 inches thick.

The Iuka soils do not have a B horizon, and the C horizon differs from the original sediment in that it has some mottles and streaks that have a color chroma of 2 or less.

In the C1 and the C2 horizon matrix colors are in hues ranging from 7.5YR to 2.5YR, value ranges from 4 to 6, and chroma ranges from 3 to 6. Mottles are of the same hue in the C1 and C2 horizons, and value ranges from 4 to 7. Mottles that have a chroma of 2 or less are always within 20 inches of the surface; mottles that have higher chromas are present in some places in the C1 and C2 horizons and are lacking in others.

The IIC3 horizon may not be at a depth of 5 feet or less. If the IIC3 horizon is missing, the C2 horizon normally extends to a depth of about 5 feet. The IIC3 horizon is highly variable in color. It is abruptly different in texture from the soil material above it, because it is a stratum of older and entirely different sediment.

Iuka soils are similar to Codorus and Lindside soils in color, drainage, and in position on flood plains. Iuka soils contain less clay than either Codorus or Lindside soils. They are less micaceous than Codorus soils and much more strongly acid than Lindside soils.

The annual temperature of the Iuka soils in the county is a few degrees cooler than the defined range for the series, but this difference does not alter their usefulness or behavior.

Iuka silt loam (Iu).—This is the only Iuka soil mapped in the county. Most of the soil is nearly level, but a few areas have slopes slightly more than 2 percent. Depressed traces of old stream channels are present in many places.

Where there is no more than a moderate hazard of flooding, the soil is suited to cultivated crops. Drainage should be improved for some crops. Cleared areas are used mostly for corn or pasture. Any areas that are subject to severe or frequent flooding can be used for seasonal grazing or trees. Capability unit IIw–7; woodland subclass 1o.

Joppa Series

The Joppa series consists of deep, well-drained to somewhat excessively drained, gently sloping to strongly sloping soils on uplands of the Coastal Plain. These soils are gravelly. They are at higher elevations, mostly in the general area northeast of Baltimore, where they formed in old sandy and highly gravelly deposits. The native vegetation is blackjack, other scrub oaks, and Virginia pine.

In a representative profile the surface layer is gravelly sandy loam about 6 inches thick. This layer is very dark grayish brown in the thinner upper part and brown or dark brown in the thicker lower part. The upper part of the subsoil is about 7 inches of yellowish-red gravelly sandy loam. The lower part of the subsoil is about 10 inches of reddish-brown gravelly sandy loam that is friable but slightly sticky. The underlying material is yellowish-red, very gravelly sand that extends to great depths. Flat fragments of iron-cemented sand and gravel, locally known as "ironstone," are common in this material.

Joppa soils are very strongly acid to extremely acid. The permeability is moderately rapid or rapid. The gravel, which consists of smooth pebbles as much as two inches in diameter, influences cultivation and management but does not affect the suitability for farming. Joppa soils warm quickly in the spring, and they can be used for early crops. They are low in available moisture capacity and in natural plant nutrients, however, and are not highly productive. Supplemental irrigation is needed during dry periods. These soils are limited for nonfarm uses mostly by slope.

Representative profile of Joppa gravelly sandy loam, 2 to 5 percent slopes, in a wooded area near the end of Klosterman Avenue, about two miles north of Fullerton:

A1—0 to 1 inch, very dark grayish-brown (10YR 3/2) gravelly sandy loam; weak, fine, granular structure; loose to very friable; many roots; very strongly acid to extremely acid; abrupt, wavy boundary.

A2—1 to 6 inches, brown or dark-brown (7.5YR 4/4) gravelly sandy loam; single grain to very weak, fine, granular structure; very friable; many roots; 25 to 35 percent rounded, well-graded pebbles as much as 2 inches diameter; extremely acid; gradual, wavy boundary.

B1—6 to 13 inches, yellowish-red (5YR 4/6) gravelly sandy loam; weak, fine, subangular blocky structure; friable, very slightly sticky; common roots; 30 to 40 percent rounded, well-graded pebbles as much as 2 inches diameter; faint coatings on some pebbles; very strongly acid to extremely acid; gradual, wavy boundary.

B2t—13 to 23 inches, reddish-brown (5YR 4/4) gravelly heavy sandy loam; weak, fine, subangular blocky structure; friable, slightly sticky; common roots; 35 to 50 percent rounded, well-graded pebbles as much as 2 inches diameter; clay bridging between sand grains; dark reddish-brown (2.5YR 3/4) films on pebbles and some peds, very strongly acid to extremely acid; gradual, wavy boundary.

C—23 to 72 inches, yellowish-red (5YR 4/8) very gravelly sand; single grain; friable; few roots; 40 to 65 percent rounded, well-graded pebbles as much as 2 inches diameter; common flat fragments of ironstone conglomerate as much as 3 inches long; dark iron stains on some pebbles; extremely acid.

The hue of the A horizon is 10YR or 7.5YR. The value ranges from 3 to 5 and the chroma from 1 to 4. The lowest value and chroma are limited to A1 horizons that are no more than 4 inches thick. The texture of the A horizon is gravelly sandy loam but ranges toward gravelly loam.

The hue of the B horizon ranges from 10YR to 5YR. The B2t horizon is at least one unit redder in hue than the B1 horizon. The value ranges from 4 to 6 and the chroma from 4 to 8. The texture of the B2t horizon is gravelly sandy loam or gravelly loam. The B horizon and upper part of the C horizon range from about 10 to 18 percent clay, which is slightly more than in the A horizon.

The C horizon has the same color range as the B horizon. It is sand or loamy sand that is gravelly to very gravelly.

The solum ranges from about 20 to 34 inches in thickness. The A horizon ranges from about 20 to 35 percent gravel. The B horizon and the upper part of the C horizon range from

about 35 to more than 50 percent gravel. This gravel is mostly siliceous, but other minerals are evident in some pebbles.

Joppa soils do not closely resemble any other soils of the county, and no other soils are so gravelly. They are closely associated with nongravelly soils of the Fort Mott and Sassafras series.

Joppa gravelly sandy loam, 2 to 5 percent slopes (JpB).—This soil has the profile described as representative of the series. Included in mapping are a few nearly level areas, some areas where the surface layer is more silty and less gravelly than described, and some spots where the subsoil is rather hard and compact.

Although there is a hazard of erosion, the most important limitation to farm use is the lack of available moisture during dry periods. The soil is best suited to early truck crops. Capability unit IIs–4; woodland subclass 3f.

Joppa gravelly sandy loam, 5 to 10 percent slopes, moderately eroded (JpC2).—This soil has a profile similar to that described as representative of the series except it has a redder colored surface layer that contains a part of the original subsoil.

Although the hazard of further erosion is severe, the soil generally is suited to crops and pastures, particularly where supplemental irrigation is available.

Included in mapping are a few areas where the surface layer is more silty and less gravelly than typical of the series, and some spots where the subsoil is rather hard and compact. Capability unit IIIe–33; woodland subclass 3f.

Joppa gravelly sandy loam, 10 to 15 percent slopes, moderately eroded (JpD2).—Most of this soil is still in trees. Included in mapping are some spots where the subsoil is rather hard and compact.

This soil is suited to an occasional cultivated crop if it is adequately protected. The hazard of further erosion is severe. Capability unit IVe–5; woodland subclass 3f.

Joppa-Urban land complex, 5 to 15 percent slopes (JuD).—This complex consists of gently sloping to moderately sloping Joppa soils that have been used for residential or other nonfarm uses. Included in mapping are many small areas that have a lower gravel content than is typical of Joppa soils. Also included are some spots where the underlying material is hard and brittle and a few acres that have slopes of more than 15 percent.

In about 15 percent of the area of this complex the soils are relatively undisturbed. In about 50 percent of the area the soils have been covered by as much as 18 inches of fill or grading material, or part of the profile has been removed by grading or cutting. The remaining 35 percent of the complex is Urban land. Where the soils have been covered by fill material to a depth of more than 18 inches, most of the profile or all of it has been cut away. Streets, roads, sidewalks, and buildings make up a large part of the complex.

The fill material generally is sandy loam, and most of it contains smooth rounded pebbles that are as much as 2 inches in diameter. In general this complex is fairly well suited to lawn grasses, ornamental shrubs, and other vegetation. Except where natural drainage has been changed by man, no hazard of wetness exists. Bedrock creates no problems. This complex has moderate to severe limitations for some uses because of slope. Suitability of soils in deeply filled or cut areas must be determined at each site. Capability unit and woodland subclass not assigned.

Kelly Series

The Kelly series consists of moderately deep, somewhat poorly drained, nearly level to moderately sloping soils on the uplands of the Piedmont Plateau. These soils formed from clayey material that weathered in place from underlying rocks that generally are dark colored, very fine grained, very hard, and nonacid. Diabase is one of the more common rocks. The native vegetation is mixed hardwoods, mainly white oak, and, in places, Virginia pine.

In a representative profile the surface layer is brown or dark-brown silt loam about 10 inches thick. The subsoil, about 22 inches thick, is dark yellowish-brown clay and brown or dark-brown heavy clay loam. The subsoil is mottled with gray, and it is sticky and very plastic. The underlying material is disintegrated rock of various colors. It contains more sand than either the surface layer or the subsoil.

Kelly soils have a high available moisture capacity and are high in mineral plant nutrients, particularly lime or calcium. The surface layer generally is very strongly acid, but the soil generally becomes less acid with increasing depth. Use of these soils is limited by impeded drainage, slow to very slow permeability, a high shrink-swell potential in the clayey subsoil, the hazard of erosion, and, in places, stoniness. They are not suited to deep-rooted crops that require good drainage and soil aeration or to perennial crops that are damaged by frost heaving.

Representative profile of Kelly silt loam, 3 to 8 percent slopes, moderately eroded in a wooded area that was formerly cultivated; about 700 feet north of Johnnycake Road and about 1 mile west of Rolling Road:

Ap—0 to 10 inches, brown or dark-brown (10YR 4/3) silt loam; weak, coarse, granular structure; friable, slightly sticky; common roots; some dark reddish-brown (5YR 3/3) fine concretions; very strongly acid; clear, wavy boundary.

B21t—10 to 25 inches, dark yellowish-brown (10YR 4/4) clay; few, fine, distinct mottles of grayish brown (2.5Y 5/2) and strong brown (7.5YR 5/6); moderate, medium, blocky and subangular, blocky structure; firm, sticky and very plastic; common roots in upper part; prominent, continuous clay films; some black fine concretions; occasional stones; medium acid; gradual, wavy boundary.

B22t—25 to 32 inches, brown or dark-brown (7.5YR 4/4) heavy clay loam; common, medium, distinct mottles of grayish brown (2.5Y 5/2); moderate, coarse, blocky and subangular, blocky structure; very firm, sticky and very plastic; few roots; continuous dark yellowish-brown (10YR 4/4) clay films; some concretions and diabase fragments; slightly acid; gradual, wavy boundary.

C—32 to 54 inches, banded yellowish-brown (10YR 5/8), light olive-brown (2.5YR 5/6), and dark reddish-brown (5YR 3/2) sandy clay loam; massive, shows inherent rock structure; very firm, sticky and plastic; slightly acid.

The matrix hue generally is 10YR but is 7.5YR in parts of the B horizon. In the A horizon the value ranges from 3 to 5 and the chroma from 1 to 3. The lowest value and chroma are limited to undisturbed A1 horizons less than 6 inches thick.

In the B horizon matrix the value is 4 or 5, and the chroma is 3 or 4 but ranges to 6. Mottling with chroma of 2 or less

is always in this horizon, and high-chroma mottling is common. The Bt horizon is 45 to 60 percent clay.

The C horizon generally is variegated in color, and is coarser in texture than the solum.

The solum ranges from about 24 to 40 inches in thickness. Depth to bedrock is about 3½ to 5 feet. About 10 percent of the solum is coarse fragments, generally of diabase or gabbro. Fine concretions are common throughout the profile.

Kelly soils are similar to Lenoir soils but are not so acid in the subsoil. Also, Kelly soils are only moderately deep to bedrock, whereas Lenoir soils are more than 10 feet deep to bedrock. Kelly soils formed in the same general kind of weathered rock material as the well-drained Montalto and Relay soils and the poorly drained Watchung soils.

Kelly silt loam, 3 to 8 percent slopes, moderately eroded (KeB2).—This soil has the profile described as representative of the series. Included in mapping are a few nearly level areas, some spots that are severely eroded, and some gravelly areas.

The soil is suited to pasture, trees, and an occasional cultivated crop that is not adversely affected by wetness, which is the main limitation to use. Drainage improvement is very difficult on this clayey, slowly permeable soil. Protection against further erosion is also needed. Capability unit IVw–3; woodland subclass 4w.

Kelly silt loam, 8 to 15 percent slopes, moderately eroded (KeC2).—This soil has a profile similar to that described as representative of the series except that the surface layer generally is thinner. Included in mapping are some severely eroded spots, some gravelly areas, and a few areas that have slopes of more than 15 percent.

The soil is suited to pasture, trees, and an occasional cultivated crop that is not adversely affected by wetness. Wetness is the main limitation to use, although the hazard of further erosion is severe where cultivation is attempted. The soil is difficult to work if the plow or other implement encounters the clay subsoil. Capability unit IVw–3; woodland subclass 4w.

Kelly very stony silt loam, 0 to 15 percent slopes (KsC).—This soil has a profile similar to that described as representative of the series except that it is very stony. A few acres of soils have slopes of more than 15 percent.

This soil is not suited to either cultivated crops or improved pasture but can be used for trees or for limited seasonal grazing. Capability unit VIIs–4; woodland subclass 4w.

Kelly-Urban land complex, 0 to 8 percent slopes (KuB).—This complex consists of soils of the Kelly series, most of which have been cut, filled, graded, or otherwise disturbed for nonfarm uses. Small areas of this complex have slopes of more than 8 percent.

In about 30 percent of this complex the soils are relatively undisturbed. In about 50 percent of the complex the soils have been covered by as much as 18 inches of fill material, or they have had as much as two-thirds of the original profile removed by grading or cutting. The remaining 20 percent is Urban land. Here the soils have been covered by fill material to a depth of more than 18 inches, or most or all of the profile has been cut away. The fill material is variable.

The clay subsoil is very plastic when wet and subject to shrinking and swelling. They have very poor stability. Undisturbed areas and cut areas that have the subsoil exposed are severely limited for building sites, roads and streets, septic tanks, and most other nonfarm uses. The suitability and limitations of filled areas must be determined by onsite investigations. Most areas are severely limited for most uses. Capability unit and woodland subclass not assigned.

Legore Series

The Legore series consists of deep, well-drained, gently sloping to steep soils on uplands of the Piedmont Plateau. These soils formed in material weathered in place from hard, dark-colored, nonacid rocks, mainly diabase and diorite. The native vegetation is mainly oaks, but black locust, black walnut, hickory, and other hardwoods also are native.

In a representative profile the surface layer is silt loam about 8 inches thick. This layer is very dark grayish brown in the thinner upper part and yellowish brown in the thicker lower part. The subsoil, about 17 inches thick, is brown and yellowish-red silty clay loam and clay loam that is quite sticky. The underlying material is olive-colored disintegrated rock that is variegated with other colors. The entire profile is very stony.

Legore soils are fairly easy to work at a favorable moisture content except where they are too stony. They have a high available moisture capacity, are very strongly acid to medium acid, and generally are well supplied with plant nutrients. They are moderately permeable. Legore soils are limited in use by slope and the erosion hazard and in some areas by stoniness.

Representative profile of Legore very stony silt loam, 3 to 15 percent slopes, in a wooded area in Patapsco State Park, about one-half mile northwest of Orange Grove:

A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) very stony silt loam; moderate, fine, granular structure; very friable, slightly sticky; interrupted by many diabase stones; very strongly acid; clear, wavy boundary.

A2—2 to 8 inches, yellowish-brown (10YR 5/4) very stony silt loam; moderate, fine, subangular blocky structure; friable, sticky and slightly plastic; interrupted by many diabase stones; very strongly acid; gradual, wavy boundary.

B21t—8 to 12 inches, brown (7.5YR 5/4) silty clay loam; moderate, medium, subangular blocky structure; friable to firm, sticky and plastic; common roots; faint, discontinuous clay films; some flecks of very dusky red (2.5YR 2/2); many diabase stones; very strongly acid; diffuse boundary.

B22t—12 to 21 inches, yellowish-red (5YR 4/6) silty clay loam; moderate, medium, subangular blocky structure; firm, sticky and very plastic; few roots; distinct, continuous strong-brown (7.5YR 5/6) clay films; some flecks of very dusky red (2.5YR 2/2); many diabase stones; strongly acid; gradual, wavy boundary.

B3—21 to 25 inches, yellowish-red (5YR 4/6) clay loam; very weak, coarse, blocky structure; firm, sticky and plastic; very few roots; many flecks of very dusky red (2.5YR 2/2); diabase stones; strongly acid; gradual, wavy boundary.

C—25 to 48 inches, olive (5Y 5/4) clay loam, variegated with yellow, gray, and black; shows inherent rock structure; firm, sticky and plastic; contains diabase stones and boulders showing exfoliate weathering; medium acid.

Hue throughout the profile centers on 7.5YR, but ranges to one unit yellower in the upper part of the profile and one unit redder in the lower part of the solum. In the A horizon, value ranges from 3 to 5 and chroma from 2 to 4. The value of 3 is limited to A1 horizons less than 6 inches thick. The texture of the A horizon generally is silt loam or gravelly

loam, but in severely eroded soils the surface layer is silty clay loam.

In the B horizon the value is 4 or 5, and the chroma ranges from 4 to 6 and in places to 8. Texture in the Bt horizon is silty clay loam or clay loam.

The C horizon is highly variable in color. It has olive to red hues, mostly medium values, and low to high chromas. Texture in the C horizon ranges from loam to silty clay loam.

The solum ranges from about 20 to 34 inches in thickness. Depth to bedrock ranges from about 5 to 10 feet. Coarse fragments of diabase, ranging from gravel to boulders in size, are throughout the profile, but in many profiles they are missing or nearly nonexistent. These fragments commonly show exfoliate or "onion" weathering.

Legore soils are less acid and less micaceous than Glenelg soils, and they have a Bt horizon that is more sticky and more plastic. They have a thinner solum and a thinner Bt horizon than Neshaminy soils. The solum and the Bt horizon of Legore soils are thinner, lower in clay content, and less red than those of Montalto soils.

Legore silt loam, 3 to 8 percent slopes, moderately eroded (LeB2).—The profile of this soil is similar to the one described as representative of the series except that there are few if any stones, particularly near the surface. Included in mapping are a few areas where the soil is nearly level, some spots of severely eroded soil, and some spots of gravelly soil.

The soil is suited to cultivated crops, pasture, and trees. The hazard of further erosion is moderate. Capability unit IIe–10; woodland subclass 2o.

Legore silt loam, 8 to 15 percent slopes, moderately eroded (LeC2).—The surface of this soil appears spotty where deep plowing turns up in the subsoil. Included in mapping are some fairly large gravelly areas.

The hazard of further erosion of this soil is severe. Where protected against further erosion, the soil is suited to cultivated crops, pasture, and trees. Capability unit IIIe–10; woodland subclass 2o.

Legore silt loam, 15 to 25 percent slopes, moderately eroded (LeD2).—Some fairly large areas of this soil are gravelly. Included in mapping are some scattered areas where the soil is not so well drained as typical Legore soils and the subsoil is firm and somewhat mottled in the lower part.

The hazard of further erosion is so severe that the soil should not be used for cultivated crops except on an occasional basis and under a program of careful erosion control. Cleared areas can be used for pasture or trees with little limitations. Uncleared areas are better suited to trees only. Capability unit IVe–10; woodland subclass 2r.

Legore silt loam, 25 to 45 percent slopes (LeE).—Nearly all areas of this soil are wooded. Included in mapping are a few acres where slope is more than 45 percent and some scattered spots where the subsoil is tough, mottled, and poorly drained.

This soil is too steep and has too much of an erosion hazard for safe cultivation. It is suited, however, to hay crops, pasture, and trees. Capability unit VIe–3; woodland subclass 2r.

Legore very stony silt loam, 3 to 15 percent slopes (LfC).—This soil has the profile described as representative of the series. Stones a foot in diameter or larger are within the profile and on the surface and generally are less than 30 feet apart. Included in mapping are some areas where the soil has a thicker subsoil than the soil described as representative of the series, and in some of these areas the subsoil is redder and more clayey.

The soil is suited to pasture, but some stones need to be removed. It also is suited to trees. The large stones make cultivation impracticable. Capability unit VIs–3; woodland subclass 2o.

Legore very stony silt loam, 15 to 25 percent slopes (LfD).—Stones a foot or more in diameter are in this soil and on the surface. They generally are less than 30 feet apart. Included in mapping are areas where the subsoil is thicker than that described as representative of the series and areas where it is redder and more clayey. The soil is suited to trees, and areas that can be mowed are suited to pasture. Capability unit VIs–3; woodland subclass 2r.

Legore very stony silt loam, 25 to 45 percent slopes (LfE).—Included in mapping are areas where the subsoil is thicker than that in the soil described as representative of the series and areas where the soil is redder and more clayey. Also included are a few acres of soils that have slopes of more than 45 percent.

This soil is suited to trees, but it is too steep and too stony for cultivated crops or improved pasture. Capability unit VIIs–3; woodland subclass 2r.

Legore silty clay loam, 8 to 15 percent slopes, severely eroded (LgC3).—The original surface layer of this soil has been lost through erosion, and the subsoil or a sticky, clayey plow layer is exposed. Included in mapping are some gravelly areas and some areas where the subsoil is redder and more clayey than in the soil described as representative of the series.

This soil can be used for an occasional cultivated crop if it is especially well protected against further erosion. It is also suited to pasture and trees. Capability unit IVe–10; woodland subclass 2o.

Legore silty clay loam, 15 to 25 percent slopes, severely eroded (LgD3).—The surface layer of this soil is sticky and clayey, and some shallow to deep gullies cut the areas. Included in mapping are areas where the subsoil is redder and more clayey than that in the soil described as representative of the series. Also included are a few spots where the soil is not well drained.

The hazard of further erosion is so severe that the soil is unsuited to cultivation. It is suited, however, to pasture and trees. Capability unit VIe–3; woodland subclass 2r.

Legore-Urban land complex, 0 to 8 percent slopes (LhB).—This complex consists of soils of the Legore series, most of which have been cut, filled, graded, or otherwise disturbed for nonfarm uses. Included in mapping are some areas where the subsoil is thicker or more clayey, or both, than is typical of Legore soils. Also included are areas where the subsoil is not yellowish red but more nearly olive in color.

In about 50 percent of the area of this complex, the soils are relatively undisturbed. In about 30 percent of the complex, the soils have been covered by as much as 18 inches of fill material, or they have had as much as two-thirds of the original profile removed by grading or cutting. The remaining 20 percent of the complex is Urban land, where the soils have been covered by fill material to a depth of more than 18 inches, most of the profile or all of it, has been cut away. The fill material generally is from adjacent areas of Legore soil that have

been cut or graded. Roads, streets, and buildings make up a large part of the complex.

Internal drainage is good on this complex, except where it has been modified by man. The areas generally are good for foundations and footings and they are satisfactory for basement and other shallow excavations, although the bedrock is very hard. The soil materials and most of the fill materials are suitable for lawns, ornamental shrubs, and other vegetation. In deeper cuts, the suitability of the soil materials must be determined locally at each site. Capability unit and woodland subclass not assigned.

Legore-Urban land complex, 8 to 15 percent slopes (LhC).—This complex consists of moderately sloping Legore soils that have been at least partly disturbed for nonfarm uses. Included in mapping are some areas where the subsoil is thicker or more clayey, or both, than is typical of Legore soils. Also included are areas where the subsoil is not yellowish red but more nearly olive in color, and a few acres that have slopes greater than 15 percent.

In about 30 percent of the area of this complex, the soils are relatively undisturbed. In about 40 percent of the complex, the soils have been covered by as much as 18 inches of fill material, or they have had as much as two-thirds of the original profile removed by cutting or grading. The remaining 30 percent of the complex is Urban land, where the soils have been covered by fill material to a depth of more than 18 inches, or most of the profile or all of it has been graded away. The fill material generally is from adjacent areas of Legore soils that have been cut or graded. Streets, sidewalks, and buildings make up part of the complex.

Internal drainage is good on this complex, except where it has been modified by man. The areas generally are good for foundations and footings and they are satisfactory for basements or other shallow excavations. The bedrock is hard. The complex is limited for some uses by slope. The soil materials and most fill materials are well suited to lawns, ornamental shrubs, and other vegetation. In deeper cuts, the suitability of the soil materials for vegetation must be determined locally at each site. Capability unit and woodland subclass not assigned.

Lenoir Series

The Lenoir series consists of deep, somewhat poorly drained, nearly level to strongly sloping soils on uplands of the Coastal Plain. These soils are mainly in the area northeast of Baltimore. They formed in old deposits of highly clayey marine sediment. The native vegetation is mostly water-tolerant hardwoods, including sweetgum, holly, maples, and oaks.

In a representative profile the surface layer is grayish-brown to very dark grayish-brown silt loam about 8 inches thick. This layer has some yellowish-red mottles in the lower part. The upper part of the subsoil, about 8 inches thick, is yellowish-brown silty clay loam that has grayish mottles. The lower part of the subsoil, about 44 inches thick, is light brownish gray in the upper part and gray or light gray in the lower part. Many yellowish-brown mottles and some mottles of other colors are in the lower part. Below a depth of about 16 inches, the subsoil is silty clay in the upper part and silty clay loam in the lower part. Most of the subsoil is quite sticky and plastic.

Lenoir soils generally are difficult to work except within a very narrow range of moisture content. They have a high available moisture capacity and are very strongly acid to extremely acid. These soils are limited in use by impeded drainage, slow permeability in the subsoil, and the hazard of erosion. They are not suited to deep-rooted crops that require good drainage and soil aeration, or to perennial crops that are damaged by frost heave.

Representative profile of Lenoir silt loam, 0 to 5 percent slopes, in a wooded area on Edwards Lane, one-third mile east of Bowleys Quarters Road:

A1—0 to 1 inch, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; friable, slightly sticky; many roots; very strongly acid; clear, wavy boundary.

A2—1 to 8 inches, grayish-brown (10YR 5/2) silt loam; many, fine, prominent mottles of yellowish red (5YR 4/8); weak, medium, subangular blocky structure; firm, slightly sticky; many roots; very strongly acid; gradual, wavy boundary.

B21t—8 to 16 inches, yellowish-brown (10YR 5/4) heavy silty clay loam; few, fine, distinct mottles of light brownish gray (10YR 6/2) and many, fine, prominent mottles of yellowish brown 10YR 5/8; weak, medium, subangular blocky structure; firm, slightly sticky and slightly plastic; many roots; discontinuous clay films; very strongly acid; gradual, wavy boundary.

B22tg—16 to 26 inches, light brownish-gray (10YR 6/2) silty clay; common, coarse, distinct mottles of yellowish brown (10YR 5/8); weak, medium, subangular blocky structure; firm, sticky and plastic; common roots; discontinuous clay films; extremely acid; gradual, wavy boundary.

B23tg—26 to 36 inches, gray or light-gray (10YR 6/1) heavy silty clay loam; many, fine, distinct mottles of yellowish brown (10YR 5/8); moderate, coarse, blocky structure; firm, plastic and slightly sticky; few roots; faint, continuous clay films; extremely acid; gradual, wavy boundary.

B3tg—36 to 60 inches, gray or light-gray (10YR 6/1) silty clay loam, marbled or streaked with yellowish brown (10YR 5/8) and dark red (10YR 3/6); weak, very coarse, blocky structure; firm, plastic and slightly sticky; a few roots in upper part; faint, discontinuous clay films; some very thin bands of sandy material; very strongly acid.

The matrix hue throughout the profile is mostly 10YR but ranges to 2.5Y. In the A horizon, value ranges from 3 to 6 and chroma from 1 to 4. The lowest value is limited to undisturbed A1 horizons that are less than 6 inches thick. Typical A horizons are either loam or silt loam in texture, but in severely eroded areas the surface layer generally is silty clay loam.

In the B horizon, the matrix color value ranges from 4 to 7. The upper Bt horizon has a chroma ranging from 3 to 8, and the lower Bt horizon has a chroma of 2 or less. There are mottles with chroma of 2 or less in the upper Bt horizon, and there generally are high-chroma mottles in all horizons except the A1 or Ap. Texture ranges from silty clay loam to clay.

In places the C horizon starts at a depth of about 60 inches. This C horizon is similar to the B3g horizon except that it shows no structure.

The solum ranges from about 50 to more than 60 inches in thickness.

Lenoir soils are similar to Kelly soils, but are more acid and much deeper to bedrock. Lenoir soils formed in the same general kind of sediment as the well-drained Christiana soils and the poorly drained Elkton soils.

The annual temperature of the Lenoir soils in Baltimore County is a few degrees cooler than the defined range for the series, but this difference does not alter their usefulness or behavior.

Lenoir loam, 0 to 5 percent slopes (LnB).—This soil has a profile similar to that described as representative of the series except that the surface layer contains less silt and more sand. Included in mapping are a few areas where a part of the surface soil has been lost through erosion.

Where drainage is improved, the soil is suited to cultivated crops, pasture, and trees. The soil can be worked more easily and sooner after rain than the Lenoir silt loam. Capability unit IIIw–5; woodland subclass 3w.

Lenoir silt loam, 0 to 5 percent slopes (LmB).—This soil has the profile described as representative for the series. Included in mapping are a few areas where a part of the surface soil has been lost through erosion.

The soil is suited to cultivated crops, pasture, and trees. Wetness is the main limitation to use, and artificial drainage is needed for most crops. Erosion generally is a minor problem. Capability unit IIIw–5; woodland subclass 3w.

Lenoir silt loam, 5 to 12 percent slopes, moderately eroded (LmC2).—This soil has lost a part of the original silty surface layer in most places. In these places, plowing turns up a part of the brighter colored subsoil, making newly plowed areas appear spotty. Included in mapping are a few areas where the surface layer is more sandy than that described as representative of the series.

The soil generally needs drainage improvement, but the hazard of further erosion generally is the more important concern of management. Within these limitations, the soil is suited to cultivated crops, pasture, and trees. Capability unit IIIe–34; woodland subclass 3w.

Lenoir silty clay loam, 5 to 12 percent slopes, severely eroded (LnC3).—The original surface layer of this soil has been lost through erosion. The subsoil is exposed, so plowing and other soil manipulation is difficult. After rain the surface crusts over upon drying, and it is extremely difficult to prevent clodding. The hazard of further erosion is severe. Within these limitations, the soil is suited to pasture, trees, and an occasional cultivated crop. Capability unit IVe–9; woodland subclass 3w.

Lenoir-Urban land complex, 0 to 5 percent slopes (LoB).—This complex consists of soils of the Lenoir series, most of which have been cut, filled, graded, or otherwise disturbed for nonfarm uses.

In about 40 percent of the area of this complex, the soils are relatively undisturbed. In about 50 percent of the complex, the soils have been covered by as much as 18 inches of fill material, or they have had as much as two-thirds of the original profile removed by cutting or grading. The remaining 10 percent of the complex is Urban land where the soils have been covered by fill material of more than 18 inches. In few places, if any, the subsoil has been almost or entirely cut away. The fill material is variable, but it generally is from adjacent areas of Lenoir soils that have been cut or graded. Roads, streets, and buildings make up part of the complex.

The clayey subsoils of this complex are plastic when wet and have poor stability. This complex has severe limitations for many nonfarm uses, including building foundations and septic tanks. This is especially true where the subsoil is now on the surface. The soils in undisturbed areas generally are fairly suitable for lawns and ornamental shrubs, while soil materials in filled and cut areas generally poor or very poor in this respect. Capability unit and woodland subclass not assigned.

Leonardtown Series

The Leonardtown series consists of deep, poorly drained, very strongly acid to extremely acid, level or nearly level soils that have a fragipan. These soils are on upland flats that lack channeled drainageways and are on the Coastal Plain. They formed in old silty deposits underlain at considerable depths by other kinds of material. The native vegetation is wetland hardwoods, including red maple and sweetgum.

In a representative profile the surface layer is very dark grayish-brown and grayish-brown silt loam about 13 inches thick. The lower part of the surface layer has yellowish-brown mottles. The upper part of the subsoil, about 8 inches thick, is light brownish-gray silty clay loam mottled with browner colors. The lower part of the subsoil, about 19 inches thick, is a fragipan that is very firm, brittle, and very slowly permeable; it is gray, mottled with yellowish brown. The underlying material is a fragipan in the upper part, and is also silty clay loam; as depth increases it becomes massive, and contains lenses of sand.

Leonardtown soils have a moderate available moisture capacity. They generally are low in natural fertility, but if well managed they are moderately productive. The fragipan impedes drainage and limits the root zone. In wet seasons a perched water table forms above the fragipan and generally rises to the soil surface. These soils are not suited to crops that are deep rooted and require good drainage and soil aeration, or to perennial plants that are damaged by frost heaving. They have severe limitations for nearly all nonfarm uses.

Representative profile of Leonardtown silt loam, in a nearly level wooded area about 100 feet north of North Point Boulevard, one-half mile east of North Point Plaza shopping center:

A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; very friable, slightly sticky; many roots; very strongly acid; clear, wavy boundary.

A2g—2 to 13 inches, grayish-brown (10YR 5/2) silt loam; many, coarse, distinct mottles of yellowish-brown (10YR 5/6); very weak, medium, subangular blocky structure; firm, slightly sticky; many roots; extremely acid; gradual, wavy boundary.

B2tg—13 to 21 inches, light brownish-gray (2.5Y 6/2) light silty clay loam; many, medium, faint mottles of pale brown (10YR 6/3) and common, fine, prominent mottles of yellowish brown (10YR 5/8); weak, medium, subangular blocky structure; firm, slightly sticky and slightly plastic; common roots; some thin clay films; extremely acid; gradual, wavy boundary.

Bx—21 to 40 inches, gray (10YR 5/1) silty clay loam; common, medium, prominent mottles of yellowish-brown (10YR 5/8); weak, thick, platy and moderate, coarse, blocky structure; very firm, brittle, sticky and plastic; few roots, prominent grayish-brown (2.5Y 5/2) clay films; extremely acid; gradual, wavy boundary.

C1x—40 to 58 inches, gray (10YR 5/1) silty clay loam; common, fine, prominent mottles of strong brown (7.5YR 5/8); weak, very thick, platy and very coarse, blocky structure; extremely firm, sticky and plastic; very few roots; very few, very faint clay films between aggregates; some dark reddish-brown (5YR 3/4) fine concretions; extremely acid; diffuse boundary.

C2g—58 to 74 inches, grayish-brown (2.5Y 5/2) silty clay loam that grades to silt loam with increasing depth; common, medium, distinct mottles of yellowish brown (10YR 5/6); massive; very firm, sticky and slightly plastic; some lenses of strong-brown (7.5YR 5/8) sand; very strongly acid.

The color of the matrix throughout the profile centers on 2.5Y hue, but hue ranges to 10YR to 5Y, or the color can be neutral in places. Mottling occurs in places and is lacking in others.

In the A horizon the value ranges from 3 to 6 and the chroma is 1 or 2. The value of 3 is limited to A1 horizons less than 6 inches thick.

In the B and C horizons, the matrix color value is 5 or 6 or, less commonly, 4, and chroma ranges from 0 to 2. The hue of the mottles in these horizons is 2.5Y, 10YR, or 7.5YR, the value ranges from 5 to 7, and the chroma from 3 to 8. The texture of the B2tg horizon is silt loam or silty clay loam, and that of the Bx horizon centers on silty clay loam.

The C horizon is the same texture as the B horizon in places, but in many profiles the C horizon contains less clay as depth increases.

The solum ranges from about 28 to 40 inches in thickness. The fragipan (Bx plus Cx horiozn) ranges from about 28 to 44 inches in thickness.

Leonardtown soils resemble Baile, Elkton, Fallsington, Othello, and Watchung soils in color and drainage. Leonardtown soils have Bx and Cx horizons that are lacking in Baile, Elkton, Fallsington, Othello, and Watchung soils. They are more acid than Watchung soils: Leonardtown soils are grayer and more poorly drained than many other Baltimore County soils that have Bx or Cx horizons.

Leonardtown silt loam (lr).—This is the only Leonardtown soil mapped in the county. It is nearly level to very gently sloping. Maximum slopes are slightly more than 2 percent. Included in mapping are a few areas that have been filled or otherwise disturbed for nonfarm uses.

Drainage is poor on this soil, and water moves very slowly through the profile. In most areas little water runs off. If drained, the soil is suited to some crops. The most common crop is corn. Undrained areas are suited to some crops. The most common crop is corn. Undrained areas are suited to trees and to seasonal pasture. The choice of crops is restricted because of the limited rooting zone and because the soil is wet for long periods of time. During extended dry periods, however, the soil above the fragipan tends to dry out almost completely. The hazard of erosion is slight. Capability unit IVw-3; woodland subclass 3w.

Lindside Series

The Lindside series consists of deep, moderately well drained, nearly level soils on flood plains. These soils are in limestone valleys on the Piedmont Plateau. They formed in fairly recent deposits of silty alluvium which washed from nearby areas of soils that developed from limestone, marble, and calciferous schist. Lindside soils are subject to flooding at irregular intervals. The native vegetation is hardwoods, but nearly all areas have been cleared for use.

In a representative profile the surface layer is dark grayish-brown silt loam about 7 inches thick. The subsoil, about 20 inches thick, is dark yellowish-brown silt loam that has grayish mottles in the lower part. The underlying material is yellowish-brown and grayish-brown silt loam that is stratified with coarser material. It is silty clay loam in the lower part and becomes gravelly as depth increases. Lindside soils are neutral to mildly alkaline throughout the profile.

Lindside soils are fairly easy to work, but they generally are wet in the spring and are late to warm. They are also subject to flooding in the spring. For these reasons, plowing and planting frequently are delayed. Artificial drainage benefits most uses. These soils are not difficult to drain where adequate outlets are available. They have a high available moisture capacity and natural fertility, and they are moderately to moderately slowly permeable. They have moderate to severe limitations for most nonfarm uses due to impeded drainage and the flooding hazard.

Representative profile of Lindside silt loam, in a nearly level idle area on Cockeysville Road, 500 feet north of its intersection with Beaver Dam Road:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable, slightly sticky; common roots; mildly alkaline; gradual, wavy boundary.

B1—7 to 18 inches, dark yellowish-brown (10YR 3/4) silt loam; few, fine, distinct mottles of strong brown (7.5YR 5/8); weak, medium, subangular blocky structure; firm, sticky; common roots; neutral; clear, smooth boundary.

B2—18 to 27 inches, dark yellowish-brown (10YR 4/4) silt loam; few, fine, distinct mottles of strong brown (7.5YR 5/8) and few, medium, faint mottles of grayish-brown (10YR 5/2); weak, medium, subangular blocky structure; very firm, sticky; few roots; neutral; clear, smooth boundary.

C1—27 to 41 inches, banded yellowish-brown (10YR 5/8) and grayish-brown (2.5Y 5/2) silt loam with lenses of loam; stratified; very firm, sticky; many mica flakes and evident dark mineral particles in lenses; neutral; clear, smooth boundary.

IIC2g—41 to 60 inches, grayish-brown (2.5Y 5/2) silty clay loam; many, coarse, prominent mottles of yellowish brown (10YR 5/8); massive; very firm, sticky and slightly plastic; some waterworn pebbles and cobblestones; neutral.

Hue throughout the profile is mostly 10YR, but ranges to 7.5YR or 2.5Y in some horizons.

In the A horizon, the value is 3 or 4 and the chroma ranges from 1 to 3. The value of 3 is limited to undistributed A1 horizons less than 6 inches thick.

In the B horizon, the value ranges from 3 to 5 and chroma from 3 to 6. Mottles have intermediate values and the chroma ranges from 1 to 8. Mottles that have a chroma of 2 or less are present within 2 feet of the soil surface; mottles that have a chroma more than 2 are present in places anywhere in the horizon. Texture in the B horizon is silt loam or silty clay loam, or both; differences in the same profile are due to differential sedimentation.

The C horizon is variable both in color and texture, and generally shows evidence of stratification.

The solum ranges from about 24 to 40 inches in thickness. Depth to bedrock ranges from about 6 to 20 feet or more. Some waterworn cherty pebbles are present throughout the profile, but are never abundant except in places in the lower IIC horizon.

Lindside soils resemble Codorus and Iuka soils in color, in drainage, and in position on flood plains. They are neutral to mildly alkaline in reaction and are high in content of lime and other plant nutrients. Codorus and Iuka soils are acid and are lower in plant nutrient content. Lindside soils formed in the same kind of material and in the same flood

plain position as the Melvin soils that are poorly drained and the Dunning soils that are very poorly drained.

Lindside silt loam (Ls).—This is the only Lindside soil mapped in the county. Most of it is smooth and nearly level, but there are a few acres that have slopes of as much as 3 percent. Included in mapping are some low hummocks, some slightly elevated natural levees along streams, and some traces of old stream channels.

Where the hazard of flooding is moderate or less frequent, the soil is well suited to cultivated crops, pasture plants, and hay crops. Where the hazard of flooding is severe or frequent, use is limited mainly to grazing and trees. The flood hazard for any particular area can be estimated only from the local history of flooding. Capability unit IIw–7; woodland subclass 1w.

Loamy and Clayey Land

Loamy and clayey land consists mainly of nearly level to steep very old clay deposits overlain by more recent deposits of sandy loam, loam, or silt loam on the upper part of the Coastal Plain. There is a wide range of variability in the thickness and texture of the mantle, and in the depth to and color of the clay. A series of holes or borings into this land reveals a different condition at nearly every spot.

Included with this land type in mapping are areas where the surface mantle contains some smooth gravel of as much as 2 inches in diameter. Flat fragments of "ironstone" (sandy material cemented by iron) are present within the mantle material in many places, particularly where the mantle is sandy loam.

The loamy mantle varies in color from gray through yellow and brown to almost red. It ranges from nearly absent to several feet in thickness. It rests abruptly over clay, but is not related in any way to the clay. In places the clay is slightly sandy. The clay can be of almost any color or mixture of colors. The clay can be almost at the surface or exposed if the mantle has been removed by erosion or other means, or it can be deeply covered by loamy material a few feet away.

The clay is very plastic and sticky, but its most important characteristic is its poor stability. Cuts through this clay are difficult to stabilize, and the clay frequently slides, slumps, or flows down the surface of cuts onto roads or other areas below it. Stability is even poorer where the clay has been disturbed by land-leveling or by filling.

This soil has variable but generally low available moisture capacity. It is very low in plant nutrient content, and is not well suited to crops even under the best management. The main limiting factors to use are low available moisture capacity and nutrient content, and slope and erosion conditions. Most areas are idle, in trees, or in residential and other nonfarm uses.

This soil, especially where it has been disturbed or graded, is severely limited or even sometimes dangerous for some uses. Because of instability the clay, particularly under pressure or load, can squeeze out from below building foundations, allowing footings or basements to crack and settle, and in extreme cases buildings have been severely damaged. Banks and fills of this material have collapsed, resulting in severe damage to property and injury and even death to people.

Loamy and clayey land, 0 to 5 percent slopes (LyB).—This mapping unit is nearly level to gently sloping. A very small acreage is used in farming. The hazard of erosion is severe where the surface is not well protected. This unit has moderate to severe limitations for many nonfarm uses. Capability unit IIIe–42; woodland subclass 3c.

Loamy and clayey land, 5 to 15 percent slopes (LyD).—This mapping unit is gently sloping to moderately sloping. Practically none of this unit is used in farming. The hazard of erosion is severe where the surface is not well protected. This unit has moderate to severe limitations for nearly all nonfarm uses. Capability unit VIe–2; woodland subclass 3c.

Loamy and clayey land, 15 to 40 percent slopes (LyE).—This mapping unit is strongly sloping to steep. Its use for any purpose is severely limited by its physical characteristics, by the slope of the land, and by the very severe hazard of erosion. Capability unit VIIe–2; woodland subclass 3c.

Made Land

Made land (Ma) consists of land areas that have been created by man. Most of it in Baltimore County has been made from industrial wastes, mostly slag and cinders. Other areas consist of spoil material from excavations, or hydraulic fill from harbor and channel deepening. Some industrial wastes, incinerator ash, and miscellaneous solid garbage wastes have been covered by hydraulic fill, especially in areas that were originally tidal marshes.

Large areas of this land have been used for industrial sites, railroad yards, airports, parking lots, and miscellaneous buildings, including some homes. This land is so variable in nature that onsite investigation is needed to determine suitabilities and limitations for proposed use. Capability unit and woodland subclass not assigned.

Manor Series

The Manor series consists of deep, well-drained to somewhat excessively drained, gently sloping to steep soils on uplands of the Piedmont Plateau. These soils formed in deep materials that weathered in place, mainly from such acid crystalline rock as mica schist. Consequently, these soils contain large amounts of mica. The native vegetation is mixed upland hardwoods, mainly oaks. Virginia pine has invaded some areas.

In a representative profile the surface layer is reddish-brown loam about 7 inches thick. The subsoil is yellowish-red, micaceous loam about 15 inches thick that in places contains rock fragments. Underlying the subsoil is loam to sandy loam that formed in disintegrated micaceous rock of many colors dominated by red. Moderately hard mica schist is at a depth of about 83 inches.

Manor soils are easy to work. They generally are medium acid to very strongly acid. Permeability is moderate to moderately rapid, and available water capacity is moderate. Although these soils are among the most susceptible to erosion in the county, they are suited to farming and to many nonfarm uses. Slope and hazard of erosion are slight to severe limitations, and in large areas stoniness is also a limitation to use.

Representative profile of Manor loam, 8 to 15 percent slopes, moderately eroded, in a pasture about 400 feet north of Walker Road, 1½ miles northeast of Rayville:

Ap—0 to 7 inches, reddish-brown (5YR 4/4) loam; moderate, fine, granular structure; loose to very friable; many roots; some mica flakes and angular quartzite gravel; strongly acid; clear, wavy boundary.

B2—7 to 14 inches, yellowish-red (5YR 4/6) loam; weak, fine, subangular blocky structure; very friable, slightly sticky; common roots; some mica flakes and angular quartzite fragments; medium acid; gradual, wavy boundary.

B3—14 to 22 inches, yellowish-red (5YR 4/6) loam; weak, very fine, subangular blocky structure; loose; few roots; many mica flakes; some fragments of soft mica schist and hard, angular quartzite; very strongly acid; diffuse boundary.

C—22 to 83 inches, red (2.5YR 4/6) loam that grades to sandy loam with depth; banded with brown and darker colors; shows inherent rock structure; soft, loose; a few roots in upper part; increasingly micaceous with depth; some soft fragments of mica schist; very strongly acid; gradual, irregular boundary.

R—83 inches, weathered, moderately hard mica schist.

The A horizon ranges from 10YR to 5YR in hue, from 4 to 6 in value, and from 1 to 4 in chroma.

In the B horizon the hue generally is 5YR, but in some places it is 7.5YR and in others it ranges toward 2.5YR. The value is 4 or 5, and the chroma ranges from 4 to 8.

In places the C horizon is variegated with many colors, but yellowish red, red, or weak red generally is dominant.

The solum ranges from about 15 to 24 inches in thickness. Depth to bedrock ranges from about 3½ feet to more than 10 feet. Channery fragments of soft to moderately hard mica schist make up 0 to 20 percent of each horizon. In some places angular fragments of hard, white quartzite are on or near the surface, and in places the soil is very stony. Texture throughout the profile is dominantly loam, but in places the C horizon is sandy loam.

Manor soils are deeper to bedrock than Mt. Airy soils, which have B and C horizons that are more than 35 percent fragments of hard schist. Manor soils are redder than Brandywine soils, which contains large quantities of fine quartzite gravel below the surface layer. Manor soils formed in the same kind of materials as Chester, Elioak, Glenelg, and Glenville soils, but they lack the Bt horizon typical of those soils. They have better natural drainage than Glenville soils.

Manor loam, 3 to 8 percent slopes, moderately eroded (MbB2).—This soil generally has a slightly thicker surface layer than that in the profile described as representative of the series. Included in mapping are some severely eroded areas and shallow gullies. Also included are small areas of more nearly level soils.

This soil is suited to cultivated crops, pasture, and trees. Under good management the hazard of further erosion is moderate. Capability unit IIe–25; woodland subclass 2o.

Manor loam, 8 to 15 percent slopes, moderately eroded (MbC2).—This soil has the profile described as representative of the series. It is suited to cultivated crops, pasture, and trees, and it is well suited to orchard crops. The hazard of further erosion is severe. Capability unit III–25; woodland subclass 2r.

Manor loam, 8 to 15 percent slopes, severely eroded (MbC3).—Nearly all of the original surface layer of this soil has been lost through erosion, and many areas are cut by shallow to deep gullies. The soil is suited to pasture and trees and to orchards that are sodded. It is marginal for cultivated crops because the hazard of further erosion is very severe in tilled areas. Capability unit IVe–25, woodland subclass 2r.

Manor loam, 15 to 25 percent slopes, moderately eroded (MbD2).—This soil is used mostly for trees or pasture. The hazard of further erosion is severe, and intensive practices are needed to control erosion if this soil is cultivated. Capability unit IVe–25; woodland subclass 2r.

Manor loam, 15 to 25 percent slopes, severely eroded (MbD3).—Most of the acreage of this soil has been cultivated at some time. All of the original surface layer, and in many places much of the subsoil, has been washed away. Gullies are common, and many of them are deep.

This soil is no longer suitable for cultivation. A protective cover of pasture, lawn, sodded orchards, or other permanent vegetation is needed. The soil is suitable for reforestation, particularly if Virginia pine or other conifers are planted. These trees would provide watershed protection for many of the critically eroded areas. Capability unit VIe–3; woodland subclass 2r.

Manor channery loam, 3 to 8 percent slopes, moderately eroded (McB2).—All layers of this soil are 15 to 30 percent flat fragments of mica schist and related rocks. Except for these stone fragments and a somewhat thicker surface layer, the profile of this soil is similar to that described as representative of the series. Depth to bedrock ranges from about 3½ to 6 feet or more.

Included with this soil in mapping are some areas of severely eroded soil and a few acres that are more nearly level than this soil.

This soil is suited to cultivated crops, pasture, and trees. The hazard of further erosion is moderate. Capability unit IIe–25; woodland subclass 2o.

Manor channery loam, 8 to 15 percent slopes, moderately eroded (McC2).—All layers of this soil are 15 to 30 percent flat fragments of mica schist and related rocks. Except for the stone fragments and generally shallower depth to bedrock, the profile of this soil is similar to that described as representative of the series. Depth to bedrock ranges from 3½ to 6 feet or more. The fragments are not extremely hard, but in places they are somewhat abrasive to farm implements. The stone fragments help protect the soil from further erosion where they are on the surface of a cultivated area.

This soil is suited to cultivated crops, pasture, trees, and sodded orchards. The hazard of further erosion is the main limitation to use. Capability unit IIIe–25; woodland subclass 2r.

Manor channery loam, 8 to 15 percent slopes, severely eroded (McC3).—Nearly all of the original surface layer of this soil has been lost through erosion, and many areas are cut by shallow to deep gullies. This soil is shallower to bedrock, but the profile otherwise is similar to that described as representative of the series. Depth to bedrock ranges from 3½ to 6 feet or more. On the surface and in rills, furrows, and gullies are accumulations of flat fragments of rock that help to protect the soil from further erosion.

The stone fragments in this soil are somewhat abrasive to farm implements. They hinder cultivation, but the soil is marginal for cultivated crops and ought to be worked only at infrequent intervals, if at all. This soil is better suited to pasture, sodded orchards, or other

trees than to cultivated crops. Capability unit IVe–25; woodland subclass 2r.

Manor channery loam, 15 to 25 percent slopes, moderately eroded (McD2).—This soil is shallower to bedrock, but its profile otherwise is similar to that described as representative of the series. Depth to bedrock ranges from about 3½ to 6 feet or more. Most areas are still in woodland, but some are in other uses where the soil has had some protection from erosion.

If this soil is cultivated, the hazard of further erosion is severe. This soil is suited to pasture, sodded orchards, or woodland. Capability unit IVe–25; woodland subclass 2r.

Manor channery loam, 15 to 25 percent slopes, severely eroded (McD3).—Most of the acreage of this soil has been cleared and cultivated at some time. All of the original surface layer and part of the subsoil have been washed away. Many gullies cut the areas, and some of them are deep. This soil is shallower to bedrock, but the profile otherwise is similar to that described as representative of the series. Depth to bedrock ranges from 3½ to 6 feet or more. In many places flat fragments or rock have accumulated on the surface and in rills and in gullies.

This soil is not suitable for cultivation, but it can be used for pastures or trees. Some sites are suitable for reforestation. The trees help protect the watershed, and they provide other benefits. Capability unit VIe–3; woodland subclass 2r.

Manor soils, 25 to 50 percent slopes (MdE).—These soils are mostly wooded. Their profile is similar to that described as representative of the series, but they are less deep to bedrock because of geologic erosion that is not readily evident. In some places the soils are gravelly or channery on the surface or throughout the profile.

Included with these soils in mapping are small areas that are less than 3 feet to bedrock, have a finer textured or redder subsoil than typical, have traces of a fragipan in the subsoil, and are not so well drained. Also included are small areas that have been disturbed for nonfarm uses.

Wooded areas of this soil provide wood products, protect the watershed, and furnish habitat for wildlife. If this soil is cleared, a cover of permanent vegetation is needed. Only limited grazing of this vegetation can be allowed. Where trees have been cleared, shrubs, vines, or other close-growing ground cover help protect the soils from further erosion. Capability unit VIe–3; woodland subclass 2r.

Manor-Urban land complex, 15 to 25 percent slopes (MeD).—This complex consists of soils of the Manor series, most of which have been graded, cut, filled, or otherwise disturbed for nonfarm uses.

Included with this complex in mapping are small areas that have a finer textured subsoil than is typical of Manor soils. Also included are a few stony areas.

In about 20 percent of the area of this complex, the soil is relatively undisturbed. In about 30 percent of the area, the soil has been covered by as much as 18 inches of fill material, or it has had as much as two-thirds of the original profile removed by cutting or grading. The remaining 50 percent of the area is Urban land, where the soil has been covered by fill material to a depth of more than 18 inches, or most of the profile or all of it has been cut away. The fill material is most commonly from adjacent areas of Manor soils that have been cut or graded. Roads and streets make up part of the complex.

Internal drainage is good on this complex. The areas generally are good for foundations and footings. In making shallow excavations for basements or other purposes, bedrock is reached in places, but the rock is mostly moderately hard and not difficult to remove. The slope severely limits use of this complex for most purposes. The soil material and fill materials are fairly suitable for grasses, ornamental shrubs, and other vegetation. Areas of cut or excavated material generally are poorly suited. Capability unit and woodland subclass not assigned.

Manor and Glenelg very stony loams, 3 to 15 percent slopes (MgC).—Most mapped areas of this unit consist of either Manor very stony loam or Glenelg very stony loam but a few areas contain both soils. These soils each have a profile similar to that described as representative of its series, but stones larger than 10 inches in diameter are on the surface and throughout the profile. The stones generally are 5 to 30 feet apart on the surface. Included in mapping are small areas of very stony Brandywine and Chester soils.

These soils can be used for hay crops or improved pasture wherever the terrain permits mowing equipment, but the stones make cultivation difficult. The soils are suited to woodland and to a number of nonfarm uses. Stoniness and the hazard of erosion are the principal limitations to use. Capability unit VIs–3; woodland subclass 2r.

Manor and Brandywine very stony loams, 15 to 25 percent slopes (MhD).—Most mapped areas of this unit consist of either Manor very stony loam or Brandywine very stony loam, but a few areas contain both soils. These soils each have a profile similar to that described as representative of its series, but stones larger than 10 inches in diameter are on the surface and throughout the profile. The stones are 3 to 30 feet apart on the surface. Included in mapping are small areas of very stony Glenelg and Chester soils.

These soils can be used for limited hay crops and pasture wherever the terrain permits mowing equipment, but the stones make cultivation difficult. The soils are suitable to woodland and to some nonfarm uses. The principal limitations to use are stoniness, slope, and the hazard or erosion. Capability unit VIs–3; woodland subclass 2r.

Manor and Brandywine very stony loams, 25 to 65 percent slopes (MhE).—This mapping unit consists of very stony soils of the Manor and the Brandywine series. Some areas consist of either Manor soil or of Brandywine soil, but other areas contain both soils.

Slope and stoniness make these soils unsuited to crops or pasture. The soils are well suited to trees, and most of the acreage is wooded. Cleared areas should be planted to Virginia pine or other suitable trees. Wooded areas provide timber products, watershed protection, and wildlife habitat. Capability unit VIIs–3; woodland subclass 2r.

Matapeake Series

The Matapeake series consists of deep, well-drained, nearly level to moderately sloping soils on uplands on

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the Coastal Plain. These soils formed in old deposits of silty marine sediment over older and coarser sediment. The native vegetation is mixed upland hardwoods, mainly oaks.

In a representative profile the surface layer is dark-brown and dark yellowish-brown silt loam about 7 inches thick. The upper part of the subsoil is strong-brown silt loam about 9 inches thick. The lower part of the subsoil, about 14 inches thick, is strong-brown silty clay loam. The underlying material, to a depth of 62 inches, is yellowish-red sandy loam that contains some fine smooth pebbles. Below this is light-gray and yellow stratified silt and silty clay loam.

Matapeake soils are easy to work at a favorable moisture content and they warm readily in spring. They have a high available moisture capacity and are suited to practically all uses. They have moderate permeability. Slope and the hazard of erosion are the main features that influence use. Matapeake soils are very strongly acid to extremely acid throughout.

Representative profile of Matapeake silt loam, 0 to 2 percent slopes, in a wooded area about 425 feet east of Bird River Beach Road, 1.1 miles north of its intersection with Graces Quarters Road:

A1—0 to 1 inch, dark-brown (10YR 3/3) silt loam; weak, fine, granular structure; very friable, slightly sticky; many roots; extremely acid; clear, wavy boundary.

A2—1 to 7 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine, granular structure; friable, slightly sticky; many roots; very strongly acid; gradual, wavy boundary.

B1—7 to 16 inches, strong-brown (7.5YR 5/6) silt loam; weak, medium, subangular blocky structure; firm, slightly sticky and slightly plastic; common roots; extremely acid; gradual, wavy boundary.

B2t—16 to 30 inches, strong-brown (7.5YR 5/6) silty clay loam; moderate, medium, subangular blocky structure; firm, slightly sticky and slightly plastic; common roots; dark-brown (7.5YR 4/4), faint, discontinuous clay films; extremely acid; gradual, wavy boundary.

IIC1—30 to 62 inches, yellowish-red (5YR 4/8) sandy loam; massive and single grain; friable to firm; few roots; some fine smooth pebbles in lower part; very strongly acid; clear, wavy boundary.

IIIC2—62 to 84 inches, variegated light-gray (10YR 7/2) and yellow (10YR 7/6) stratified silt and silty clay loam; firm, slightly sticky and slightly plastic; some lenses of reddish-yellow (5YR 6/8) loose sand; very strongly acid.

In the A horizon, the hue is 10YR or 2.5Y, the value ranges from 3 to 6, and the chroma from 1 to 4. The value of 3 and the chroma of 1 are limited to undisturbed A1 horizons less than 6 inches thick.

In the B horizon, the hue is 10YR or 7.5YR, the value is 4 or 5, and the chroma ranges from 4 to 8. The texture of the Bt horizon is silt loam or silty clay loam, and the average content of clay is 18 to 30 percent.

The IIC and the IIIC horizons are variable in color and are streaked or mottled in places in the lower part. Texture in the IIC horizon ranges from sand to sandy loam. In places there is no IIIC horizon. Where there is a IIIC horizon, it contrasts strongly in texture with the IIC horizon.

The solum ranges from about 26 to 40 inches in thickness. Some fine smooth pebbles are in the profile, but they are not abundant except in places in the lower IIC horizon.

Matapeake soils resemble Chillum and Sassafras soils in color and in drainage. Matapeake soils have a friable C horizon. Matapeake soils contain much more silt and less sand in the solum than the Sassafras soils. Matapeake soils formed in the same kind of silty material as the moderately well drained Beltsville and Mattapex soils, the somewhat poorly drained Barclay soils, and the poorly drained Leonardtown and Othello soils.

Matapeake silt loam, 0 to 2 percent slopes (MkA).—This soil has the profile described as representative of the series. Included in mapping are some areas that have a discontinuous, rather firm layer in the lower subsoil. This is one of the best soils for farming in the Coastal Plain part of the county. If it is well managed, it has practically no hazards or limitations that affect farming or other uses. Capability unit I–4; woodland subclass 3o.

Matapeake silt loam, 2 to 5 percent slopes (MkB).—The slope of this soil is enough to cause a moderate hazard of erosion, but at the time of mapping only a few mapped areas had lost any important part of the surface layer. Included in mapping are a few areas where the subsoil extends to a depth of about 50 inches, and some spots that have a rather firm layer in the lower part of the subsoil. If management is reasonably good, this soil is suited to practically all uses. Capability unit IIe–4; woodland subclass 3o.

Matapeake silt loam, 5 to 12 percent slopes, moderately eroded (MkC2).—This soil has lost a moderate amount of the surface layer so that plowing turns up subsoil in places, giving these cultivated areas a spotty surface appearance. Included in mapping are some small, severely eroded areas that make up about 10 percent of this soil. Also mapped with this soil are minor inclusions of soils that are firm in the lower part of the subsoil. If adequate protective measures are employed against the severe hazard of erosion, this soil is suited to nearly all uses. Capability unit IIIe–4; woodland subclass 3o.

Mattapex Series

The Mattapex series consists of deep, moderately well drained, nearly level to gently sloping soils on uplands of the Coastal Plain. These soils formed in old deposits of silty material underlain by older, coarser textured sediment. The native vegetation is mixed hardwoods that tolerate wetness.

In a representative profile the surface layer is dark grayish-brown silt loam about 9 inches thick. The subsoil, about 27 inches thick, is yellowish-brown and dark yellowish-brown silty clay loam and silt loam that is mottled in the lower part. The underlying material is yellowish-brown mottled silt loam.

Mattapex soils are fairly easy to work, but at times in spring they are not dry and warm soon enough for early planting. Artificial drainage is needed for some crops, especially in the more nearly level areas. These soils are strongly acid to very strongly acid and have a high available moisture capacity. Permeability is moderately slow. Seasonal wetness and impeded drainage impose moderate to severe limitations on Mattapex soils for many nonfarm uses. Erosion is a moderate hazard in sloping areas.

Representative profile of Mattapex silt loam, 2 to 5 percent slopes, in a cultivated area on Holly Neck Road, one mile east of Back River Neck Road:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; friable, slightly sticky; many roots; strongly acid; clear, smooth boundary.

B21t—9 to 17 inches, yellowish-brown (10YR 5/4) light silty clay loam; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic;

common roots; distinct clay films; very strongly acid; gradual, wavy boundary.

B22t—17 to 26 inches, yellowish-brown (10YR 5/6) heavy silt loam; common, medium, distinct mottles of light brownish gray (10YR 6/2) and few, fine, faint mottles of strong brown (7.5YR 5/8); weak, medium, subangular blocky structure; friable to firm, slightly sticky; few roots; distinct but discontinuous clay films; very strongly acid; gradual, wavy boundary.

B3—26 to 36 inches, dark yellowish-brown (10YR 4/4) silt loam; common, coarse, distinct mottles of pale brown (10YR 6/3) and light brownish gray (10YR 6/2); weak, medium, subangular blocky structure; friable to firm, slightly sticky; faint clay films in upper part; very strongly acid; gradual, wavy boundary.

C—36 to 72 inches, yellowish-brown (10YR 5/8) silt loam; many, coarse, prominent mottles of gray or light gray (10YR 6/1); massive; firm; distinctly gritty with fine sand; very strongly acid.

Hue throughout the profile is either 10YR or 2.5Y.

In the A horizon, the value ranges from 3 to 5 and the chroma from 1 to 4. The lower value is in undisturbed A1 horizons less than 6 inches thick, and the highest chroma is in undisturbed A2 horizons.

In the B horizon, the value ranges from 4 to 6 and the chroma from 4 to 8. Mottles that have chroma of 2 or less occur in the lower part of the Bt horizon and in the B3 horizon. The Bt horizon is silt loam or silty clay loam that is 18 to 30 percent clay.

The C horizon is similar to the B3 horizon except that it lacks structure. In some profiles a IIC horizon of highly contrasting coarser texture replaces the C horizon. Fine smooth pebbles are in the IIC horizon in places.

The solum ranges from about 30 to 40 inches in thickness.

Mattapex soils resemble Delano and Woodstown soils in color and drainage but are more silty in the solum. They are deeper to bedrock than Delanco soils and are less sandy throughout the profile than Woodstown soils. Mattapex soils formed in the same kind of silty material as the Matapeake, Beltsville, Barclay, Leonardtown, and Othello soils.

Mattapex silt loam, 0 to 2 percent slopes (MlA).—The profile of this soil is similar to the one described as representative of the series, but the lower part of the subsoil generally is mottled with lighter gray colors. Impeded drainage is the principal limitation to use and management. Where drainage is improved it is well suited to cultivated crops and improved pasture. The choice of plants is more restricted in undrained areas. Capability unit IIw–1; woodland subclass 3o.

Mattapex silt loam, 2 to 5 percent slopes (MlB).—This soil has the profile described as representative of the series. Included in mapping are a few moderately to severely eroded areas, and a few areas of soils that have slopes of more than 5 percent. The soil has good surface drainage, and does not need drainage improvement for many crops. The hazard of erosion is moderate in tilled areas. Capability unit IIe–16; woodland subclass 3o.

Mattapex-Urban land complex, 0 to 5 percent slopes (MmB).—This complex consists of soils of the Mattapex series that have been graded, cut, filled, or otherwise disturbed for nonfarm uses. Included in mapping are some areas where the subsoil is less silty but more sandy than is typical of Mattapex soils.

In about 35 percent of the area of this complex, the soils are relatively undisturbed. In about 40 percent of the complex, the soils have been covered by as much as 18 inches of fill material, or they have had as much as two-thirds of the original profile removed by cutting or grading. The remaining 25 percent of the complex is Urban land, where the soils have been covered by fill material to a depth of more than 18 inches, or most of the profile or all of it has been cut or graded away. The fill material is variable, but it generally is from adjacent areas of the same kinds of soils. Roads, streets, sidewalks, and buildings make up a large part of the complex.

Except where fill materials are deep, seasonal wetness limits the suitability of this complex for building sites, septic tanks, and other nonfarm uses. The soil materials, and most fill materials, are fairly suitable for lawn grasses, ornamental shrubs, and other vegetation. In deeply filled or cut areas, suitability of the soil materials must be determined locally at each site. Capability unit and woodland subclass not assigned.

Melvin Series

The Melvin series consists of deep, poorly drained, nearly level soils in depressions and on flats of flood plains. These soils are in limestone valleys on the Piedmont Plateau. They formed in recently deposited silty alluvium that washed from soils derived from limestone, marble, and calciferous schists. Melvin soils are subject to flooding at irregular intervals. The native vegetation is wetland hardwoods, many willows, and alders.

In a representative profile the surface layer is brown or dark-brown silt loam about 9 inches thick. The subsoil, about 31 inches thick, is grayish-brown mottled silt loam in the upper part, dark grayish-brown mottled silty clay loam in the middle part, and gray mottled silty clay loam in the lower part. The underlying material is olive-brown, loose, gravelly sandy loam.

Melvin soils are difficult to work if too wet or too dry. Generally they are wet until late in spring, which delays plowing and planting. The water table is at or near the soil surface for long periods during the year. Artificial drainage is needed for nearly all uses. Melvin soils have a high available moisture capacity and natural fertility. Permeability is moderate to moderately slow. Soil reaction is slightly acid to strongly acid. Melvin soils have severe limitations for most nonfarm uses because of poor drainage and, in some places, flooding.

Representative profile of Melvin silt loam, in a nearly level cultivated area on Park Heights Avenue, one-fourth mile north of Caves Road:

Ap—0 to 9 inches, brown or dark-brown (10YR 4/3) silt loam, variegated with light yellowish brown (10YR 6/4); moderate, fine, granular structure; friable, slightly sticky; many roots; strongly acid; clear, wavy boundary.

B1g—9 to 17 inches, grayish-brown (2.5Y 5/2) heavy silt loam; many, medium, distinct mottles of brownish-yellow (10YR 6/8); weak, medium, subangular blocky structure; firm, slightly sticky; common roots; medium acid; gradual, wavy boundary.

B2g—17 to 29 inches, dark grayish-brown (2.5Y 4/2) light silty clay loam; many, coarse, prominent mottles of of yellowish-brown (10YR 5/8); weak, coarse, blocky structure; firm, sticky and slightly plastic; common roots; medium acid; gradual, wavy boundary.

B3g—29 to 40 inches, gray (N 5/0) light silty clay loam; common, medium, prominent mottles of yellowish brown (10YR 5/4 and 5/6); weak, very coarse, blocky structure; firm, slightly sticky and slightly plastic; common roots; slightly acid; abrupt, wavy boundary.

IIC—40 to 54 inches, light olive-brown (2.5Y 5/4) gravelly sandy loam; single grain; loose; neutral.

Hue throughout the profile ranges from 10YR to 5Y, or the color may be neutral. Hue of 10YR generally is limited to horizons near the surface.

In the A horizon, value ranges from 3 to 6, and chroma from 1 to 3. The value of 3 is limited to undisturbed A1 horizons that are less than 6 inches thick.

In the matrix of the B horizon, value ranges from 4 to 6 and chroma from 0 to 2. The value of mottling in this horizon ranges from 3 to 5 and chroma from 3 to 8. The texture of the B horizon generally is silt loam or silty clay loam.

The IIC horizon is abrupty coarser in texture than the B horizon and generally is gravelly. It ranges from a uniform color to highly variegated and mottled. Generally, it is lacking within 40 inches of the soil surface.

The solum ranges from about 30 to 40 inches in thickness. Depth to bedrock ranges from about 6 to 20 feet or more. Few, if any, coarse fragments are in the solum, but the C horizon is gravelly in places.

Melvin soils resemble Hatboro soils that are also on flood plains. Melvin soils are more silty and less micaceous than Hatboro soils, and they are also much less acid and contain more plant nutrients. The Melvin soils formed in the same kind of material as the moderately well drained Lindside soils and the very poorly drained Dunning soils.

Melvin silt loam (Mn).—This nearly level soil has the profile described as representative of the series. Where the soil is artificially drained and there is no more than a moderate hazard of flooding, it is very well suited to corn, some hay crops, and highly improved pasture. In areas where flooding is frequent or severe, use is limited mainly to trees. Capability unit IIIw–3; woodland subclass 1w.

Melvin silt loam, local alluvium (Mo).—This soil has a profile similar to the one described as representative of the series, except it is in upland depressions, on some foot slopes, and around the heads of some drainageways. Most of this soil is nearly level, but some of it has slopes of as much as 5 percent. Where artificially drained this soil is very well suited to many annual crops and to highly improved pasture. Perennial crops that are damaged by frost heaving are not well suited to this soil. Capability unit IIIw–3; woodland subclass 1w.

Mine Dumps and Quarries

Mine dumps and quarries (Mr) consists of the various hard-rock excavations, in addition to spoil areas or dumps associated with them. Most of the mines were used for obtaining low-grade iron ore, and have been abandoned for many years. Associated spoil or dump areas generally are overgrown by brush, vines, or trees. The most prominent quarries are those used for marble or limestone in the general area of Cockeysville. Associated with some quarries are small areas of rock rubble. Possible uses for any of these areas, except where they are still in operation, must be determined by onsite investigation. Capability unit VIIIs–4; woodland subclass not assigned.

Montalto Series

The Montalto series consists of deep, well-drained, gently sloping to moderately sloping soils on uplands of the Piedmont Plateau. These soils formed in materials weathered in place from very hard, dark-colored basic rocks, mostly diabase. They generally are on elongated ridges where dikes of this rock were once exposed on the surface. The native vegetation is mixed upland hardwoods, mainly oaks.

In a representative profile the surface layer is reddish-brown silt loam about 9 inches thick. The subsoil, about 45 inches thick, is mostly red or dark-red clay or silty clay that is very sticky, but the lower few inches is silty clay loam. The underlying material is dark-red clay loam that is sticky and plastic and that contains much soft, highly weathered rock material.

Montalto soils are fairly easy to work at a favorable moisture content. They have a high available moisture capacity and a fairly high natural content of calcium and other mineral plant nutrients. Reaction is slightly acid to strongly acid, and permeability is moderately slow. These soils are well suited to farming and to many other uses. The main limitations are those imposed by slope and the hazard of erosion.

Representative profile of Montalto silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated area 150 feet north of Liberty Road, 1.8 miles northwest of its intersection with the Baltimore Beltway:

Ap—0 to 9 inches, reddish-brown (2.5YR 4/4) silt loam; moderate, fine, granular structure; friable, sticky; many roots; some subangular diabase cobblestones and angular quartzite gravel; medium acid; abrupt, smooth boundary.

B21t—9 to 23 inches, dark-red (2.5YR 3/6) silty clay; moderate, medium, blocky structure; firm, plastic and very sticky; common roots; thin, distinct clay films; some subangular cobblestones of gabbro and diabase and angular quartzite gravel; slightly acid; gradual, wavy boundary.

B22t—23 to 40 inches, red (10R 4/6) clay; strong, coarse, blocky structure; very firm, very sticky and very plastic; few roots; thick, prominent, dark-red (10R 3/6) continuous clay films; some angular fragments of quartzite and hard gabbro and diabase; some soft, weathered diabase; strongly acid; gradual, wavy boundary.

B3—40 to 54 inches, dark-red (2.5YR 3/6) silty clay loam; moderate, medium, blocky structure; very firm, plastic and very sticky; very few roots; some fragments of quartzite and hard gabbro and diabase; some soft, weathered diabase; strongly acid; diffuse boundary.

C—54 to 60 inches, dark-red (2.5YR 3/6) clay loam containing much soft, highly weathered rock material of many colors; massive; firm, sticky and plastic; some quartzite and hard gabbro and diabase fragments; strongly acid.

In the A horizon, the hue generally is 5YR, but ranges to 7.5YR or 2.5Y. The value is 3 or 4 and the chroma ranges from 2 to 4. The value of 3 is limited to undisturbed A1 horizons less than 6 inches thick. The texture of the A horizon generally is silt loam, but in severely eroded areas the texture of the Ap horizon generally is silty clay loam.

In the B horizon, the hue ranges from 5YR to 10R, the value is 3 or 4, and the chroma ranges from 4 to 8. The texture of the Bt horizon generally is clay or silty clay, but some subhorizons are heavy silty clay loam or heavy clay loam that is high in silt and low in sand. The texture of the B3 horizon is coarser than that of the Bt horizon.

The C horizon is red or is variegated in places with a wide range of mixed colors. The texture of the C horizon ranges from loam to silty clay loam or clay loam.

The solum ranges from about 40 to 60 inches in thickness. Depth to bedrock ranges from about 5 to 12 feet. Rock fragments, ranging in size from gravel to boulders, appear in places throughout the profile. These fragments generally are of diabase and show exfoliate concentric weathering.

Montalto soils resemble Christiana, Elioak, Sunnyside, and Hagerstown soils in color and drainage. They are less acid than Christiana, Sunnyside, and Elioak soils and are richer in natural plant nutrients. Montalto soils formed in

residuum from dark basic igneous rocks and contain coarse fragments of those rocks. Hagerstown soils formed in residuum from fairly pure limestone. Montalto soils formed in the same kind of material as the well-drained Legore and Relay soils, the somewhat poorly drained Kelly soils, and the poorly drained Watchung soils.

Montalto silt loam, 3 to 8 percent slopes, moderately eroded (MsB2).—This soil has the profile described as representative of the series (fig. 8). Included in mapping are some gravelly soils and a few acres of nearly level soils. Also included are some scattered severely eroded areas where the subsoil is almost exposed or completely exposed.

The soil is well suited to crops, pasture, and woodland. The hazard of further erosion is moderate. Capability unit IIe-4; woodland subclass 2c.

Montalto silt loam, 8 to 15 percent slopes, moderately eroded (MsC2).—This soil has a surface layer that is thinner than the one described as representative of the series. Plowing turns up the subsoil in places, which makes freshly worked areas appear red spotted. Included in mapping are a few gravelly soils.

The hazard of further erosion is severe, but if adequately protected the soil is suited to cultivated crops, hay crops, pastures, orchards, and woodland. Capability unit IIIe-4; woodland subclass 2c.

Mt. Airy Series

The Mt. Airy series consists of moderately deep, somewhat excessively drained, gently sloping to strongly sloping soils on uplands of the Piedmont Plateau. These soils generally are in the northwestern part of the county, at higher elevations. They formed in fragmental materials that weathered in place from hard slaty rocks containing much mica. The native vegetation is mixed upland hardwoods and Virginia pine.

Figure 8.—**Montalto silt loam, 3 to 8 percent slopes, moderately eroded, near Catonsville. Maximum depth shown is about 5 feet.**

In a representative profile the surface layer, about 7 inches thick, is brown or dark-brown channery loam that contains many thin flat fragments of mica schist. The subsoil, about 28 inches thick, is strong-brown to yellowish-red channery loam that contains even more fragments. The underlying material is mostly schist fragments with about 25 percent fines. Bedrock is at a depth of about 40 inches.

Mt. Airy soils are not difficult to work, but the fragments are somewhat abrasive to farm implements. They have a low to moderate available moisture capacity but if well managed are moderately productive. Reaction is strongly acid to very strongly acid, and permeability is moderate to moderately rapid. The moderate depth of the root zone, a tendency toward droughtiness, and the hazard of erosion are important limitations to farming. The limited depth to bedrock is a moderate to severe limitation for some nonfarm uses.

Representative profile of Mt. Airy channery loam, 8 to 15 percent slopes, moderately eroded, in a cultivated area on the east side of Paper Mill Road, one-fourth mile south of Rockland Road:

Ap—0 to 7 inches, brown or dark-brown (7.5YR 4/2) channery loam; moderate, fine, granular structure; very friable, slightly sticky; many roots; about 25 percent schist fragments; some angular quartzite fragments; strongly acid; clear, smooth boundary.

B1—7 to 19 inches, strong-brown (7.5YR 5/6) channery loam; weak, fine, blocky structure; friable, slightly sticky; common roots; about 40 percent schist fragments; some angular quartzite gravel; strongly acid; clear, wavy boundary.

B2—19 to 35 inches, yellowish-red (5YR 4/6) channery loam; moderate, fine, blocky structure; friable, sticky; common roots; 40 to 50 percent schist fragments; very strongly acid; gradual, wavy boundary.

C—35 to 40 inches, yellowish-red (5YR 5/6) very channery loam; weak, fine, blocky structure; friable, slightly sticky; few or no roots; about 85 percent schist fragments; very strongly acid; gradual, wavy boundary.

R—40 inches, moderately hard, weathered and fragmented albite mica schist, with some fine material within fractures; some hard white quartzite inclusions.

In the A horizon, the hue generally is 10YR but ranges to 2.5Y and 7.5YR. The value ranges from 3 to 6 and the chroma from 1 to 4. The lowest value and chroma are in undisturbed A1 horizons less than 6 inches thick.

In the B horizon, the hue generally is 7.5YR but ranges from 10YR to 5YR. The value is 4 or 5, and the chroma ranges from 4 to 6, or, rarely, 8. The C horizon has about the same color range as the B horizon.

The solum ranges from about 15 to 36 inches in thickness. The depth to bedrock ranges from about 24 to 40 inches. Schist fragments range from about 15 to 35 percent in the A horizon, from about 40 to 75 percent in the B horizon, and from about 85 to nearly 100 percent in the C horizon. The texture of the fine material throughout the profile is loam that generally is high in silt.

Mt. Airy soils are shallower to bedrock than the Manor and Brandywine soils. They contain many flat fragments of schist, whereas the Brandywine soils contain much quartzite gravel and the Manor soils have relatively few coarse fragments.

Mt. Airy channery loam, 3 to 8 percent slopes, moderately eroded (MtB2).—The profile of this soil is similar to the one described as representative of the series, except that the surface layer generally is thicker. Included in mapping are some widely scattered, severely eroded soils.

This soil is suited to most crops and other uses but supplemental irrigation is needed in an average season. The hazard of further erosion is moderate. Fine material washes away, leaving the schist fragments on the soil surface. Capability unit IIIe-10; woodland subclass 3f.

Mt. Airy channery loam, 8 to 15 percent slopes, moderately eroded (MtC2).—This profile has the profile described as representative of the series. Included in mapping are some small, severely eroded soils.

This soil is suited to a number of uses. The severe hazard of further erosion when tilled and droughtiness limit this soil to only an occasional cultivated crop. Fine material washes away readily, leaving schist fragments on the soil surface. Capability unit IVe-10; woodland subclass 3f.

Mt. Airy channery loam, 15 to 25 percent slopes, moderately eroded (MtD2).—This soil is shallower to bedrock than the one described as representative of the series. It is therefore more droughty.

This soil has severe limitations to cultivated crops but is suited to pasture and trees. The severe hazard of further erosion is the main limitation to use. Capability unit VIe-3; woodland subclass 3f.

Mt. Airy channery loam, 15 to 25 percent slopes, severely eroded (MtD3).—This soil has lost practically all of the original surface layer through erosion, and in many places a part of the subsoil has been washed away. Gullies cut the area in many places. Accumulations of flat fragments of mica schist are common on the surface, in rills and gullies, and at the bases of slopes.

The soil is too steep and severely eroded for cultivation or improved pasture. It can be used for limited grazing. Most areas should be reforested with Virginia pine or another suitable species. Trees would furnish watershed protection, wood products, and wildlife habitat. Capability unit VIIe–3; woodland subclass 3f.

Neshaminy Series

The Neshaminy series consists of deep, well-drained, gently sloping to moderately sloping soils on uplands of the Piedmont Plateau. These soils formed in materials weathered in place from such fairly dark colored rock as granodiorite or from a mixture of such light-colored acid rocks and dark-colored basic rocks as mica schist and diorite and diabase. The native vegetation is mixed upland hardwoods, mainly oaks.

In a representative profile the surface layer is dark-brown to strong-brown silt loam about 7 inches thick. The subsoil, about 33 inches thick, is yellowish-red clay loam and silty clay loam. The underlying material is yellowish-red silt loam to loam weathered from disintegrated rock. It contains many, soft to hard rock fragments.

Neshaminy soils are fairly easy to work. They have a high available moisture capacity and are fairly well supplied with natural plant nutrients. They generally are strongly acid in the upper layers and become less acid as depth increases. Permeability is moderate. The chief limitations to all uses are those imposed by slope and by the hazard of erosion.

Representative profile of Neshaminy silt loam, 3 to 8 percent slopes, moderately eroded, in a wooded area at the intersection of Deer Park Road and Lyons Mill Road:

A1—0 to 1 inch, dark-brown (7.5YR 3/2) silt loam; weak, fine, granular structure; friable; many roots; very strongly acid; abrupt, smooth boundary.

A2—1 to 7 inches, strong-brown (7.5YR 5/6) silt loam; moderate, fine, subangular blocky structure; firm, slightly sticky; many roots; strongly acid; gradual, smooth boundary.

B21t—7 to 16 inches, yellowish-red (5YR 5/6) silty clay loam; moderate to strong, medium, subangular blocky structure; firm, slightly sticky and slightly plastic; common roots; faint discontinuous clay films; some fine concretions and hard and soft rock fragments; medium acid; gradual, wavy boundary.

B22t—16 to 32 inches, yellowish-red (5YR 5/6) clay loam; moderate, medium, subangular blocky structure; very firm, slightly sticky and slightly plastic; faint clay films; some fine concretions and hard to soft rock fragments; medium acid; diffuse boundary.

B3—32 to 40 inches, yellowish-red (5YR 5/6) clay loam; weak, medium, subangular blocky structure; firm, slightly sticky and slightly plastic; few roots; some fine concretions and hard to soft rock fragments; slightly acid; diffuse boundary.

C—40 to 60 inches, yellowish-red (5YR 5/6) silt loam, grading to loam with depth; massive with inherent rock structure; firm, slightly sticky and slightly plastic; many hard to soft rock fragments, increasing in size and number with depth; neutral.

In the A horizon, the hue generally is 7.5YR but ranges to 10YR. The value ranges from 3 to 5, and the chroma from 2 to 6. The value of 3 is limited to undisturbed A1 horizons less than 6 inches thick. Chroma of 6 is infrequent and is limited to A2 horizons.

In the B horizon, the hue generally is 5YR, but in places the upper part of the horizon is 7.5YR, and the lower part is 2.5YR. The value in the B horizon is 4 or 5, and the chroma ranges from 4 to 8. The Bt horizon is silty clay loam or clay loam that is 26 to 35 percent clay. Some thin subhorizons are more than 35 percent clay.

The C horizon is one color in places and variegated in others, but reddish hues with medium to high values and chromas are dominant. The texture of the C horizon ranges from sandy loam to silt loam or clay loam.

The solum ranges from about 36 to more than 50 inches in thickness. Depth to bedrock ranges from about 4 to 10 feet. Angular gravel or stones are present in places throughout the profile. Gravel generally is quartzite; stones are quartzite, acid crystalline rocks, or basic rocks.

Neshaminy soils are less red than Montalto soils and have less clay in the Bt horizon. They are less acid than Elioak soils and thicker than Legore soils. Neshaminy soils are less acid and less micaceous than Chester soils, and generally are redder than Chester soils.

Neshaminy silt loam, 3 to 8 percent slopes, moderately eroded (NeB2).—This soil has the profile described as representative of the series. Included in mapping are a few severely eroded areas, some gravelly soils, and some scattered acres that are nearly level.

This soil is suited to nearly all crops, to pasture, and to trees. The hazard of further erosion is moderate. Capability unit IIe–4; woodland subclass 2o.

Neshaminy silt loam, 8 to 15 percent slopes, moderately eroded (NeC2).—This soil has a profile similar to the one described as representative of the series, but in many areas both the surface layer and the subsoil are

thinner. Plowing to normal depth turns up the subsoil in places, which makes the soil surface appear spotted with red. Included in mapping are some gravelly soils, and some minor areas where the lower part of the subsoil is firm and brittle and mottled with grayish colors.

If properly protected, this soil is suited to cultivated crops, pasture, and trees. The hazard of further erosion is severe in cultivated areas. Capability unit IIIe-4; woodland subclass 2o.

Othello Series

The Othello series consists of deep, poorly drained, nearly level soils on upland flats of the Coastal Plain. These soils formed in old deposits of silty material underlain by older sandy sediment. The native vegetation is wetland hardwoods, mostly oaks, sweetgum, blackgum, red maple, and holly.

In a representative profile the surface layer is grayish-brown silt loam about 10 inches thick. The subsoil, about 24 inches thick, is gray or light-gray silt loam or silty clay loam that is mottled with brown colors. The underlying material is gray or light-gray mottled loamy fine sand. Gray or light-gray silty clay is at a depth of about 46 inches.

Othello soils are not difficult to work at a favorable moisture content, but they should not be worked when the water table is near the surface. These soils have a high available moisture capacity. They are very strongly acid to extremely acid throughout. Permeability is moderately slow. Artificial drainage is needed for most crops and other uses. Poor internal drainage and the high water table severely limit the use of Othello soils for nonfarm purposes (fig. 9).

Representative profile of Othello silt loam, in a level idle area on the north side of Schaffers Road, 0.2 mile east of Holly Neck Road.

Ap—0 to 10 inches, grayish-brown (2.5Y 5/2) silt loam; weak, medium, granular structure; friable, slightly sticky; common roots; some fine concretions; very strongly acid; clear, smooth boundary.

B21tg—10 to 20 inches, gray or light-gray (10YR 6/1) silt loam; common, medium, distinct mottles of yellowish brown (10YR 5/8); weak, medium, subangular blocky structure; firm; slightly sticky; common roots; faint clay films; extremely acid; gradual, wavy boundary.

B22tg—20 to 29 inches, gray or light-gray (10YR 6/1) silty clay loam; many, coarse, prominent mottles of strong brown (7.5YR 5/8); weak, coarse, subangular blocky structure; firm, sticky and plastic; few roots; few, distinct gray (10YR 5/1) clay films; extremely acid; gradual, wavy boundary.

B3g—29 to 34 inches, gray or light-gray (10YR 6/1) silt loam; many, coarse, prominent mottles of strong brown (7.5YR 5/8); weak, coarse, subangular blocky structure; friable, slightly sticky; few roots; extremely acid; gradual, wavy boundary.

IIC1—34 to 46 inches, gray or light-gray (10YR 6/1) loamy fine sand, streaked with olive brown (2.5Y 4/4); few, medium, prominent mottles of yellowish brown (10YR 5/6); single grain; friable; extremely acid; clear, wavy boundary.

Figure 9.—**Rising water table in Othello silt loam caused construction of this building to be abandoned.**

IIIC2—46 to 74 inches, gray or light-gray (10YR 6/1) silty clay; many, coarse, prominent mottles of strong brown (7.5YR 5/8); massive; firm, sticky and plastic; extremely acid.

The hue throughout the profile is 10YR or yellower, and in places is neutral. In the A horizon, value ranges from 4 to 6 and chroma from 0 to 2. The highest value generally is limited to undisturbed A2 horizons.

In the B horizon, value ranges from 5 to 7 and chroma from 0 to 2. Mottles are 10YR or 7.5YR in hue, 5 or 6 in value, and range from 3 to 8 in chroma. The Bt horizon is silt loam or silty clay loam that is 18 to 30 percent clay. The lower part of the B horizon is very weakly platy in places.

The IIC horizon is sandy loam or coarser in texture, and has about the same color range as the B horizon. The IIIC horizon is present in places. Where it is present, it is similar to the IIC in color but differs sharply in texture.

The solum ranges from about 24 to 40 inches in thickness.

Othello soils resemble Baile, Elkton, Fallsington, Leonardtown, and Watchung soils in color and in drainage. Othello soils have a more highly silty Bt horizon than any of these except the Leonardtown soils, which have a dense, platy, fragipan lower B horizon. They contain less clay in the Bt horizons than Elkton and Watchung soils, and are more acid than Watchung soils. Othello soils formed in the same kind of silty material as the well-drained Matapeake and Chillum soils, the moderately well drained Beltsville and Mattapex soils, the somewhat poorly drained Barclay soils, and the poorly drained Leonardtown soils.

Othello silt loam (Ot).—This is the only Othello soil mapped in the county. It is mostly nearly level, but included in mapping are a few small areas that have slopes of slightly more than 2 percent.

If artificially drained the soil is suited to cultivated crops, pasture, and trees. The most common crop is corn. Perennial crops, such as alfalfa, that are damaged by frost heaving are not suited to this soil. Capability unit IIIw-7; woodland subclass 3w.

Pocomoke Series

The Pocomoke series consists of deep, very poorly drained, nearly level sandy soils on flats and in depressions on uplands of the Coastal Plain. These soils formed in sandy marine sediment containing only small amounts of silt or clay. The native vegetation is wetland hardwoods, including red or swamp maple, oaks, gum, and a few pond pines.

In a representative profile the surface layer is sandy loam about 18 inches thick. This layer is black in the upper part and very dark gray in the lower part. The subsoil, about 22 inches thick, is gray and light-gray sandy loam that is mottled with brownish colors. The underlying material is very pale brown loose sand that is mottled with various colors.

Pocomoke soils are easy to work except when the water table is at or near the surface, as it is for long periods of the year. Artificial drainage is needed for practically all uses. These soils are easy to drain wherever there are adequate outlets. These soils are very strongly acid to extremely acid. Available moisture capacity is high and permeability is moderate. Poor natural drainage and a high water table impose severe limitations for most nonfarm uses.

Representative profile of Pocomoke sandy loam, in a nearly level wooded area about 150 feet from the end of Leland Avenue at Middle River.

A11—0 to 12 inches, black (10YR 2/1) sandy loam; moderate, medium, granular structure; very friable, slightly sticky; many roots; very strongly acid; gradual, wavy boundary.

A12—12 to 18 inches, very dark gray (10YR 3/1) sandy loam; weak, medium, granular structure; friable, slightly sticky; common roots; some fine, smooth quartz gravel; very strongly acid; clear, wavy boundary.

B1g—18 to 26 inches, gray (10YR 5/1) sandy loam; common, medium, distinct mottles of light yellowish brown (2.5Y 6/4); weak, fine, subangular blocky structure; friable, slightly sticky; common roots; about 15 percent fine, smooth quartz gravel; very strongly acid; gradual, wavy boundary.

B2tg—26 to 40 inches, light-gray (10YR 7/2) sandy loam; many, coarse, faint mottles of very pale brown (10YR 7/4); weak, fine, subangular blocky structure; friable, slightly sticky; common roots; thin clay films bridging between sand grains; few fine, smooth pebbles; extremely acid; gradual, wavy boundary.

C—40 to 60 inches, very pale brown (10YR 7/3) sand; many, medium, distinct mottles of brownish yellow (10YR 6/6) and reddish yellow (7.5YR 6/8); single grain; loose; few roots; some thin lenses of sandy clay at depth of about 56 inches; extremely acid.

In the A horizon, the hue ranges from 10YR to 5Y. The value in the A1 or Ap horizon is 2 or 3 and the chroma is 1 or 2. In some profiles there is a thin A2 horizon that has value ranging from 4 to 6 and chroma of 1 or 2.

In the B horizon, the hue is 10YR, 2.5Y, 5Y, or the color is neutral in places. The value ranges from 4 to 7, and chroma is 2 or less. Mottles have chromas ranging from 3 to 8. The Bt horizon is sandy loam or fine sandy loam that is less than 18 percent clay and less than 30 percent silt. The Bt horizon has at least 3 percent more clay than the A horizon.

The C horizon has about the same color range as the B horizon. The texture of the C horizon is either sand or loamy sand.

The solum ranges from about 22 to 40 inches in thickness. In many areas the solum is less than 30 inches thick.

Pocomoke soils do not closely resemble any other soil of Baltimore County. On essentially the same kind of sediment, however, are the well-drained Fort Mott soils; and on sediment containing somewhat more clay are the well-drained Sassafras soils, the moderately well drained Woodstown soils, and the poorly drained Fallsington soils.

The annual temperature of the Pocomoke soils in Baltimore County is a few degrees cooler than the defined range for the series, but this difference does not alter their usefulness.

Pocomoke sandy loam (Po).—This is the only Pocomoke soil mapped in the county. Most of this soil is nearly level, but there are areas on the fringes of depressions where the slope is more than 2 percent.

Unless the soil is drained, its use is confined mainly to trees. Drained soils are used for corn, soybeans, truck crops, or home gardens. Capability unit IIIw-6; woodland subclass 2w.

Relay Series

The Relay series consists of deep, well-drained, gently sloping to steep soils on uplands of the Piedmont Plateau. These soils formed in materials weathered in place from such rocks as metagabbro that are high in magnesium. Some of these soils are very stony. The native vegetation is mixed hardwoods.

In a representative profile the surface layer is dark olive-gray silt loam about 5 inches thick. The subsoil, about 15 inches thick, is clay loam that is dominantly olive in color. Underlying the subsoil is sandy, disintegrated rock material (fig. 10). This material is green as

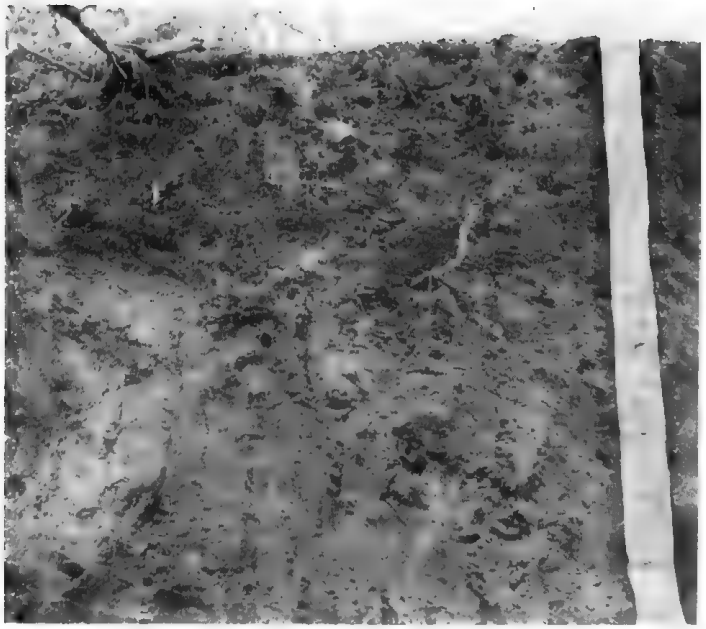

Figure 10.—Profile of Relay silt loam on Smith Avenue west of City of Baltimore boundary line. Below a depth of 20 inches is sandy, disintegrated metagabbro rock.

well as other colors. Bedrock is at a depth of about 84 inches.

Relay soils are easy to work, except where they are too stony. They have a high available moisture capacity and a good supply of natural plant nutrients, especially magnesium. Reaction is strongly acid in the surface layer and subsoil and medium acid to neutral in the underlying material. Permeability is moderate. They are suited to nearly all uses, except where limited by slope, the hazard of erosion, and stoniness.

Representative profile of Relay silt loam, 8 to 15 percent slopes, moderately eroded, in an idle area on the north side of Smith Avenue, about one-half mile east of Old Pimlico Road:

Ap—0 to 5 inches, dark olive-gray (5Y 3/2) silt loam; moderate, medium, granular structure; friable, slightly sticky; many roots; strongly acid; clear, wavy boundary.

B2t—5 to 20 inches, olive (5Y 4/3) clay loam, variegated with dark grayish brown (2.5Y 4/2) and olive brown (2.5Y 4/4); moderate, fine to very fine, blocky structure; friable to firm, sticky and slightly plastic; common roots; prominent dark reddish-brown (5YR 3/3) clay films; some inclusions similar to the C horizon in lower part; strongly acid; clear, wavy boundary.

C—20 to 84 inches, banded dark greenish-gray (5G 4/1), yellow (2.5Y 7/6), and black (N 2/0) very fine sandy loam; massive with inherent rock structure; very friable; very few roots in upper part; medium acid in upper part that grades to neutral in lower part; clear, irregular boundary.

R—84 inches, hard metagabbro.

Hue throughout the profile is 2.5Y or 5Y, or ranges in places to 5GY or 5G.

In the A horizon, the value ranges from 3 to 5 and the chroma is 2 or 3. The value of 3 is limited to horizons less than 6 inches thick. Most A horizons are silt loam, but the Ap horizon in severely eroded areas is commonly clay loam.

The B horizon has a value of 4 or 5 and a chroma of 3, 4, or, rarely, 6. There can be variegations with grayer colors, but gray colors are not due to impeded drainage or aeration. The texture of the Bt horizon generally is clay loam, but in places there is a subhorizon of silty clay loam or clay.

The C horizon has a wide range of colors that generally are variegated. Hue of 5G is more common in the C horizon than in the solum. Texture of the C horizon ranges from loam to sandy loam.

The solum ranges from about 20 to 34 inches in thickness. Depth to bedrock ranges from about 4 to 7 feet.

Relay soils are similar to Legore soils except that they are dominantly olive in color. Legore soils are dominantly brown to yellowish red.

Relay silt loam, 8 to 15 percent slopes, moderately eroded (ReC2).—This soil has the profile described as representative of the series. Included in mapping are some severely eroded soils, some gravelly areas, and a few areas that have slopes of less than 8 percent.

The soil is suited to cultivated crops, pasture, and trees. The hazard of further erosion is severe. Capability unit IIIe-10; woodland subclass 2o.

Relay silt loam, 15 to 25 percent slopes, moderately eroded (ReD2).—Most areas of this soil are still in trees. The hazard of further erosion on this soil is so great that the soil is suited mainly to hay crops, pasture, and trees, although an occasional cultivated crop can be grown under very good management. Capability unit IVe-10; woodland subclass 2r.

Relay very stony silt loam, 3 to 25 percent slopes (RsD).—This soil has a profile similar to that described as representative of the series, except that the surface layer generally is thicker and there are many stones in the profile. These stones generally are larger than 10 inches in diameter, and in most places are less than 30 feet apart. This makes cultivation impracticable, but the soil can be used for pasture or for hay crops wherever the terrain will permit mowing. Most of the soil is under cover of trees. Capability unit VIs-3; woodland subclass 2r.

Relay very stony silt loam, 25 to 65 percent slopes (RsE).—A very few acres of this soil have been disturbed or altered for nonfarm uses. This soil is so steep and so stony that use is very severely limited. It is best suited to trees, watershed protection, wildlife habitat, and parks or nature study areas. Capability unit VIIs-3; woodland subclass 2r.

Relay clay loam, 15 to 25 percent slopes, severely eroded (RyD3).—Most of this soil has been cultivated for so long without adequate protection against erosion that the original surface layer is almost gone or entirely gone. Much of the subsoil has also been washed away in many places. The present surface layer is mostly exposed subsoil. Many gullies cut the area. Included in mapping are a few gravelly areas.

The soil is no longer suited to cultivation because of the serious hazard of further erosion. A protective cover of grasses, shrubs, vines, or other vegetation should be kept on the soil permanently. Reforestation with Virginia pine is a suitable alternative. Capability unit VIe-3; woodland subclass 2r.

Sand and Gravel Pits

Sand and gravel pits (Sg) consists of excavations from which gravel or sand, or both, have been or are being removed, mainly for road fill or other construction. Included in mapping are large borrow pits and areas

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where earthy soil material rather than gravel or sand has been or is being extracted, mainly for fill. Onsite investigation is needed to determine possible uses for any of these areas. Clay pits are not included in this mapping unit. Capability unit VIIIs-4; woodland subclass not assigned.

Sassafras Series

The Sassafras series consists of deep, well-drained, nearly level to steep soils on uplands of the Coastal Plain. These soils formed in unconsolidated deposits of very old, dominantly sandy sediment. The native vegetation is mixed hardwoods, mainly oaks; Virginia pine has invaded some areas.

In a representative profile the surface layer is brown sandy loam about 10 inches thick. The subsoil, about 23 inches thick, is dark yellowish-brown sandy loam in the upper part, yellowish-red sandy clay loam in the middle part, and strong-brown sandy loam in the lower part. The underlying material is yellowish-brown loamy sand that grades to sand.

Sassafras soils are easy to work. They have a moderate to high available moisture capacity and are moderately to highly productive under good management. Reaction is strongly acid to very strongly acid and permeability is moderate. The only important limitations to farming and for most nonfarm uses are those imposed by slope and by the hazard of erosion.

Representative profile of Sassafras sandy loam, 0 to 2 percent slopes, in an idle area about 0.3 mile north of Chesaco Park:

Ap—0 to 10 inches, brown (10YR 4/3) sandy loam; weak, fine, granular structure; very friable, slightly sticky; many roots; strongly acid; clear, smooth boundary.

B1—10 to 16 inches, dark yellowish-brown (10YR 5/4) sandy loam; weak, medium, subangular blocky structure; friable, slightly sticky; common roots; very strongly acid; gradual, wavy boundary.

B2t—16 to 28 inches, yellowish-red (5YR 5/6) sandy clay loam; weak, medium, subangular blocky structure; friable, sticky and slightly plastic; few roots; discontinuous clay films; very strongly acid; gradual, wavy boundary.

B3—28 to 33 inches, strong-brown (7.5YR 5/6) sandy loam; very weak, medium, subangular blocky structure; very friable, slightly sticky; few roots; very strongly acid; gradual, wavy boundary.

C—33 to 74 inches, yellowish-brown (10YR 5/4) loamy sand that grades to sand with depth; single grain; loose; some thin, discontinuous lenses of strong-brown (7.5YR 5/6) sandy loam in upper part; very strongly acid.

The solum ranges from about 30 to 40 inches in thickness. Some profiles contain as much as 20 percent fine smooth pebbles in the solum, and as much as 30 percent in the C horizon.

The hue of the A horizon generally is 10YR. The value ranges from 3 to 5, and the chroma from 1 to 4. The lowest value and chroma are limited to undisturbed A1 horizons less than 4 inches thick. The texture is loam or sandy loam.

The hue of the B horizon generally is 7.5YR, but ranges to 10YR and 5YR. The value is 5 or 6, and the chroma ranges from 4 to 8. The texture of the Bt horizon generally is sandy clay loam, but ranges to heavy sandy loam and heavy loam. It is 18 to 27 percent clay and 20 to 35 percent silt.

The color of the C horizon is similar to that of the B horizon, but in some profiles is variegated. The C horizon is coarser in texture than the B horizon, and is as coarse or coarser than the A horizon. In some profiles the C horizon is moderately hard and brittle when dry.

Sassafras soils are similar to Chester, Glenelg, Chillum, Fort Mott, Matapeake, and Sunnyside soils. They contain less mica but more sand than Chester and Glenelg soils, and contain less silt and more sand than Chillum and Matapeake soils. Sassafras soils have a thinner A horizon and a finer textured Bt horizon than Fort Mott soils. They are not as red as Sunnyside soils. On essentially the same kind of sediment as the Sassafras soils are the moderately well drained Woodstown soils and the poorly drained Fallsington soils.

Sassafras sandy loam, 0 to 2 percent slopes (ShA).—This soil has the profile described as representative of the series. It is suited to cultivated crops, hay crops, pasture, orchards, and trees. It is especially suited to early truck crops. There are no important limitations to use under good management. Capability unit I-5; woodland subclass 3o.

Sassafras sandy loam, 2 to 5 percent slopes (ShB).—This soil has a profile similar to that described as representative of the series. Included in mapping of this soil are some soils that have lost part of their original surface layer through erosion and a few areas that are more severely eroded. There are also areas where the underlying material is hard and brittle rather than loose as described.

This soil is suited to cultivated crops, pasture, and nearly all other uses. The hazard of erosion is moderate. Capability unit IIe-5; woodland subclass 3o.

Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded (ShC2).—Moderate amounts of material in the surface layer of this soil have been lost in many places through erosion. Plowing turns up small amounts of subsoil in many places, making the new surface appear spotty. Included in mapping of this soil are small areas where the underlying material is hard and brittle. The soil is suited to nearly all uses, but the hazard of further erosion is severe where the soil is tilled. Capability unit IIIe-5; woodland subclass 3o.

Sassafras sandy loam, 5 to 10 percent slopes, severely eroded (ShC3).—This soil has lost all, or nearly all, of the original surface layer, and in many places much of the subsoil through erosion. The new surface layer is dark yellowish-brown sandy loam that contains yellowish-red, more clayey material.

This soil is marginal for tillage and is suited to no more than an occasional cultivated crop. It is better suited to pasture and hay crops, orchards, and trees. Capability unit IVe-5; woodland subclass 3o.

Sassafras sandy loam, 10 to 15 percent slopes, moderately eroded (ShD2).—A large acreage of this soil is still in trees. Where it has been cleared and used there have been moderate losses of the surface layer through erosion, and material in the subsoil has been mixed with the remaining surface soil by plowing. Included in mapping are areas where the surface layer is a little more silty and less sandy than is typical for this soil. Also included are some areas where the surface layer is thicker and very sandy. The soil is suited to pasture, hay, sodded orchards, trees, or an occasional cultivated crop. Capability unit IVe-5; woodland subclass 3o.

Sassafras loam, 0 to 2 percent slopes (SlA).—The surface layer of this soil contains less sand and more fine material than the surface layer of the profile described as representative of the series. The soil holds moisture

and plant nutrients better than does Sassafras sandy loam. Under good management the soil can be used for nearly all purposes, with few limitations. Capability unit I-4; woodland subclass 3o.

Sassafras loam, 2 to 5 percent slopes (SlB).—The surface layer of this soil is a little more silty and less sandy than in the profile described as representative of the Sassafras series. Most of this soil has lost little if any of its original surface layer, but there are areas where some soil has been washed away. A few gullies cut the area. Where protective measures are taken against the moderate hazard of erosion, the soil is suited to nearly all uses. Capability unit IIe-4; woodland subclass 3o.

Sassafras loam, 5 to 10 percent slopes, moderately eroded (SlC2).—Some of the original surface layer of this soil has been lost in places through erosion, and material in the subsoil has been mixed with the remaining surface soil by plowing. The new surface has a spotty appearance.

This soil is suited to cultivated crops, pasture, hay, orchards, and woodland, but the hazard of further erosion is severe. Appropriate erosion-control measures are needed to grow cultivated crops and for other intensive uses. Capability unit IIIe-4; woodland subclass 3o.

Sassafras-Urban land complex, 0 to 5 percent slopes (SnB).—This complex consists of soils of the Sassafras series, most of which have been cut, filled, graded, or otherwise disturbed for nonfarm uses. Included in mapping are a few gravelly areas, some soils that have a silty surface layer, and some spots where the underlying material is hard and brittle.

In about 25 percent of the area of this complex, the soils are relatively undisturbed. In about 55 to 60 percent of the complex the soils have been covered by as much as 18 inches of fill material, or they have had as much as two-thirds of the original profile removed by grading or cutting. The remaining 15 to 20 percent is Urban land, where the soils have been covered by fill material to a depth of more than 18 inches, or most of the profile or all of it has been cut away. Streets, sidewalks, and buildings make up a large part of the complex.

The fill material is mostly sandy loam in texture, but some of it is gravelly and some is silty. Except where natural drainage may have been changed by man, there are no hazards of soil wetness for building sites and other uses. The soil materials and most fill materials are fairly well suited to lawns, ornamental shrubs, and other vegetation. Suitability of the soil material in deeply filled or cut areas must be determined locally at each site. Capability unit and woodland subclass not assigned.

Sassafras and Joppa soils, 5 to 15 percent slopes, severely eroded (SsD3).—This mapping unit contains soils of either the Sassafras or Joppa series, or both. Under the severely eroded conditions on these slopes, there is little difference between the two soils except that the Joppa soils are gravelly while the Sassafras soils are not. This unit consists of about equal parts of Sassafras and Joppa soils.

Included with these soils in mapping are some areas where the underlying material is hard and brittle, and a few areas that have restricted subsoil drainage. On most of these soils the surface layer is mostly subsoil that has been exposed by erosion, or of subsoil that has been turned up by plowing. Some gullies cut the area. The soils generally are unsuited to cultivation, but can be used for hay, pasture, or trees. Capability unit VIe-2; woodland subclass 3o.

Sassafras and Joppa soils, 15 to 30 percent slopes (SsE).—This mapping unit consists of about equal areas of Sassafras and Joppa soils. Joppa soils are gravelly, while Sassafras soils are not. There are no significant differences in use and management. Included in mapping are some very sandy areas, silty areas, and areas where the subsoil or underlying material is hard and brittle. Also included are small areas that are not well drained. Most of the area has some kind of woodland cover. These soils are not suited to cultivation, but are suited to hay, pasture, or trees. Capability unit VIe-2; woodland subclass 3r.

Stony Land

Stony land, steep (St) is mostly on heights above the Patapsco River, but there are small areas elsewhere in the county. It consists of areas that are much too stony for normal soil development. Most stones are 1 to 2 feet in diameter, and they are about 1 to 3 feet apart. The stones vary and can be chlorite schist, granitized schist, gneiss, gabbro, diorite, or of other related material. The terrain is strongly sloping to very steep, and slopes are as much as 75 percent. The terrain is very rough and irregular. This land is not suited to farming. It can be used to produce very limited amounts of wood products, but woodland management generally is impractical and not economical. It furnishes habitat for some kinds of wildlife. Capability unit VIIIs-1; woodland subclass 5x.

Sunnyside Series

The Sunnyside series consists of deep, well-drained, nearly level to gently sloping soils on uplands of the Coastal Plain. These soils have a red subsoil. They formed in unconsolidated deposits of very old, dominantly sandy sediment. The native vegetation is mixed upland hardwoods, mainly oaks, and some Virginia pine.

In a representative profile the surface layer is fine sandy loam about 10 inches thick. This layer is very dark gray in the upper part and brown in the lower part. The upper part of the subsoil is yellowish-red sandy loam about 8 inches thick. The lower part of the subsoil is red, sticky, heavy sandy loam about 22 inches thick. The underlying material is yellowish-red light sandy loam.

Sunnyside soils are strongly acid to extremely acid and are easy to work. They have a moderate available moisture capacity and are moderately permeable. They are productive under good management. The only important limitation to farming and many nonfarm uses are those imposed by slope and by the hazard of erosion.

Representative profile of Sunnyside fine sandy loam, 0 to 5 percent slopes, moderately eroded, in a wooded area near the intersection of Perry Road and the Baltimore Beltway:

A1—0 to 2 inches, very dark gray (10YR 3/1) fine sandy loam; weak, fine, granular structure; very friable; many roots; extremely acid; clear, wavy boundary.

A2—2 to 10 inches, brown (7.5YR 5/4) fine sandy loam; weak, fine, granular structure; friable, many roots; very strongly acid; gradual, wavy boundary.

B1—10 to 18 inches, yellowish-red (5YR 4/8) sandy loam; weak, very fine, subangular blocky structure; friable, slightly sticky; many roots; very strongly acid; gradual, wavy boundary.

B2t—18 to 40 inches, red (2.5YR 4/8) heavy sandy loam; moderate, fine, subangular blocky structure; friable, sticky; many roots in upper part; red (2.5YR 4/6) to yellowish-red (5YR 4/8) discontinuous clay coats; very strongly acid; gradual, wavy boundary.

C—40 to 50 inches, yellowish-red (5YR 4/8) light sandy loam, with some thin, irregular bands of yellower, more sandy material; single grain; very friable; few roots; traces of mica; strongly acid to very strongly acid.

The hue in the A horizon is 10YR or 7.5YR. The value ranges from 3 to 5 and chroma from 1 to 4. The value of 3 is limited to A1 horizons less than 4 inches thick. The texture of the A horizon generally is fine sandy loam, but ranges toward loam and sandy loam.

The hue in the B horizon centers on 2.5YR, but ranges to 5YR and 10R. The value ranges from 4 to 6 and the chroma from 4 to 8. Texture of the B2t horizon is heavy sandy loam, heavy loam, or sandy clay loam that is 18 to 30 percent clay.

The C horizon has the same color range as the B horizon, and ranges from fine sand to sandy loam in texture. In places there is a IIC horizon within 60 inches of the surface that is abruptly finer in texture; generally it is clay or silty clay.

The solum ranges from 30 to 40 inches in thickness. The profile contains few fine, smooth pebbles. There are flat fragments of ironstone conglomerate in places throughout the profile, but these are more common at the juncture of the B and C horizons or within the C horizon.

Sunnyside soils resemble Christiana, Elioak, Hagerstown, and Montalto soils in color and drainage, but are coarser in the B horizon than any of those soils. Sunnyside soils are more acid than Hagerstown and Montalto soils and are redder in color than the otherwise similar Sassafras soils.

Sunnyside fine sandy loam, 0 to 5 percent slopes, moderately eroded (SuB2).—This is the only Sunnyside soil mapped in the country. Included in mapping are a few small areas where the surface layer is more silty and less sandy than that described as representative of the series. The soil is suited to cultivated crops, hay crops, pasture, orchards, and trees. The hazard of further erosion is moderate. Capability unit IIe-5; woodland subclass 2o.

Swamp

Swamp (Sw) consists of small areas of wet land that is under fresh water all, or nearly all, of the time. The soil materials have not been classified, but consist largely of silt in some areas and of sand in others. In most places there is much partly decomposed organic matter. This land is not used for farming, but generally is wooded with such trees as red maple, swamp magnolia, and ash. These are considered mostly noncommercial, because growth and quality generally are poor. Cattails, sedges, and various herbs are in open areas. Included in mapping are a few brackish areas near the heads of tidal creeks. This land makes very good habitat for some kinds of wildlife. Capability unit VIIw-1; woodland subclass not assigned.

Tidal Marsh

Tidal marsh (Tm) consists of many small and a few fairly large areas covered regularly by tidal water. The areas border parts of Chesapeake Bay and parts of major estuaries and tidal streams. The soil material ranges from sand to clay, and in some places it is peaty or mucky. Most areas have a high content of salt, but a few are only brackish. Many areas contain sulfur compounds, and when these are drained or dried they are extremely acid. The vegetation is marsh grass, sedges, salt-tolerant herbs, and low shrubs.

Tidal marsh is not suited to crops, pasture, or trees. It makes suitable habitat for many kinds of wildlife, and along with adjacent waterways, it is suitable for some kinds of outdoor recreation. Capability unit VIIIw-1; woodland subclass not applicable.

Watchung Series

The Watchung series consists of deep, poorly drained, nearly level to gently sloping soils on upland flats, on foot slopes, and in depressions on the Piedmont Plateau. These soils formed in materials weathered in place chiefly from such hard black rocks as diabase, but also from such basic rocks as serpentine. The native vegetation is water-tolerant oaks and other wetland hardwoods.

In a representative profile the surface layer is dark grayish-brown silt loam about 6 inches thick. Below the surface layer is a subsurface layer about 6 inches thick. This layer is light olive-brown silt loam that is mottled with grayish brown and yellowish brown. The subsoil, about 30 inches thick, is gray and dark-gray silty clay that is mottled yellowish brown in the upper and middle parts. The lower part of the subsoil is gray to greenish-gray mottled silty clay loam. The underlying material, extending to a depth of 72 inches or more, is dark greenish-gray mottled sandy clay loam that contains some stones and boulders.

Watchung soils generally are neutral to slightly acid. Permeability is slow and available moisture capacity is high. They are wet for long periods of the year, and are so difficult to work at other times that they are seldom used for cultivated crops. Poor drainage and the high water table severely limit the use of Watchung soils for nonfarm purposes. Some areas are also very stony.

Representative profile of Watchung silt loam, 3 to 8 percent slopes, in a pastured area near Windsor Mill Road where it crosses over the Baltimore Beltway, about 4 miles south of Pikesville:

Ap—0 to 6 inches, dark grayish-brown (2.5Y 4/2) silt loam; moderate, medium, granular structure; friable, slightly sticky; many roots; some diabase cobblestones; slightly acid; clear, smooth boundary.

A2—6 to 12 inches, light olive-brown (2.5Y 5/4) silt loam; many, medium, faint mottles of grayish brown (2.5Y 5/2) and common, fine, distinct mottles of yellowish brown (10YR 5/8); very weak, medium, blocky structure; firm, sticky; common roots; some diabase cobblestones; slightly acid; abrupt, wavy boundary.

B21tg—12 to 19 inches, gray (5Y 5/1) silty clay; many, medium, prominent mottles of yellowish-brown (10YR 5/8); weak, coarse, blocky structure; firm, sticky and very plastic; common roots; prominent dark-gray (N 4/0) continuous clay films; some diabase cobblestones; neutral; gradual, wavy boundary.

B22tg—19 to 28 inches, dark-gray (5Y 4/1) silty clay; common, fine, prominent mottles of yellowish brown (10YR 5/8); weak, very coarse, blocky structure; firm, sticky and very plastic; few roots; prominent

dark-gray (N 4/0) continuous clay films; some diabase cobblestones; neutral; gradual, wavy boundary.

B3g—28 to 42 inches, variable gray (5Y 5/1) to greenish-gray (5GY 5/1) silty clay loam; common, medium, prominent mottles of yellowish-brown (10YR 5/6); weak, very coarse, blocky structure; very firm, sticky and plastic; very few roots; some diabase cobblestones; neutral; gradual, wavy boundary.

Cg—42 to 72 inches, dark greenish-gray (5GY 4/1) sandy clay loam, variegated with strong brown (7.5YR 5/8); massive; friable, sticky and plastic; grades toward sandy loam with depth; some diabase stones and boulders; neutral.

In the A horizon, the hue is 10YR, 2.5Y, 5Y, or neutral. The value ranges from 3 to 5 and the chroma from 0 to 4. The lowest value and chroma are limited to very thin A1 horizons and the highest to A2 horizons.

In the B horizon the hue, in places, is in the same range as that of the A horizon, but it can be 5GY, 5G, or 5BG in matrices. The value ranges from 4 to 6 and the chroma from 0 to 2, or in places 3. Mottles are mostly in hues 10YR to 5YR, with value of 4 or 5 and chroma ranging from 4 to 8. The texture of the Bt horizon is 40 to 60 percent clay or silty clay. In some profiles the Bt horizon is very sticky.

The C horizon has the same range of matrix hue as the B horizon and the same low matrix chroma. It is prominently mottled, streaked, or variegated with high-chroma colors. The C horizon is coarser in texture than the B horizon, and shows traces of inherent rock structure in places.

The solum ranges from 24 to 48 inches in thickness. Depth to bedrock ranges from about 5 to 10 feet. There are gravel, cobblestones, or stones throughout the profile in places. Stones are more common on or near the surface, and gravel or cobblestones are more common as depth increases.

Watchung soils resemble Baile, Elkton, Fallsington, Leonardtown, and Othello soils in color and drainage. Watchung soils have a finer textured Bt horizon than Baile, Fallsington, Leonardtown, and Othello soils. Watchung soils are neutral to slightly acid in reaction, as compared to the more acid Elkton soils.

Watchung silt loam, 0 to 3 percent slopes (WaA).—The profile of this soil is similar to the one described as representative of the series. Small areas have been filled or otherwise disturbed for nonfarm uses.

In addition to being very wet, this soil is difficult to drain and difficult to work. It has severe limitations for cultivated crops, but if grazing is controlled, is suited to pasture and to wetland trees. There is little or no hazard of erosion. Capability unit Vw-1; woodland subclass 1w.

Watchung silt loam, 3 to 8 percent slopes (WaB).—This soil has the profile described as representative of the series. Included in mapping are small areas of soils that slope more than 8 percent and some scattered areas of soils that have a thicker, darker colored surface layer than is typical. There are also a few areas that have been filled or otherwise disturbed for nonfarm uses.

The soil is suited to improved pasture, but grazing ought to be limited and controlled to prevent destruction of sod. Drainage is difficult, but the slope facilitates removal of surface water. There is a moderate hazard of erosion. Capability unit VIw-2; woodland subclass 1w.

Watchung very stony silt loam, 0 to 8 percent slopes (WcB).—This soil has a profile similar to that described as representative of the series. It has stones, 1 to 2 feet in diameter, about 30 feet apart on the surface and in the soil. The stones and soil wetness prevent adequate preparation of the soil for improved pasture. It is suited to limited grazing, trees, and wildlife habitat. Capability unit VIIs-4; woodland subclass 1w.

Woodstown Series

The Woodstown series consists of deep, moderately well drained, nearly level to gently sloping soils on uplands of the Coastal Plain. These soils formed in unconsolidated deposits of very old sandy materials containing moderate amounts of silt and clay. The native vegetation is mixed hardwoods that tolerate wetness; mainly oak, hickory, some maple, and holly.

In a representative profile the surface layer is sandy loam about 9 inches thick. This layer is very dark brown in the upper part and yellowish brown in the lower part. The subsoil, about 28 inches thick, is yellowish-brown sandy clay loam and sandy loam that is mottled with grayish colors in the lower part. The underlying material is light yellowish-brown, mottled and streaked, loamy fine sand that extends to a depth of 60 inches or more.

Woodstown soils are easy to work, but seasonal wetness sometimes prevents early plowing and planting. Reaction is very strongly acid to extremely acid. Available moisture capacity is moderate to high. Permeability is moderate. Seasonal wetness and the seasonal high water table impose moderate to severe limitations on the use of Woodstown soils for some nonfarm purposes.

Representative profile of Woodstown sandy loam, 0 to 2 percent slopes, in a wooded area on the north side of Miller Island Road, about 1½ miles west of Baylight Beach:

A1—0 to 1 inch, very dark brown (10YR 2/2) sandy loam; moderate, fine, granular structure; very friable, slightly sticky; many roots; very strongly acid; clear, wavy boundary.

A2—1 to 9 inches, yellowish-brown (10YR 5/4) sandy loam; weak, fine, blocky structure; friable, slightly sticky; common roots; very strongly acid; gradual, wavy boundary.

B21t—9 to 17 inches, yellowish-brown (10YR 5/4) sandy clay loam, faintly variegated with yellowish brown (10YR 5/8); weak, medium, subangular blocky structure; friable, sticky and slightly plastic; common roots; faint clay films; very strongly acid; gradual, wavy boundary.

B22t—17 to 25 inches, yellowish-brown (10YR 5/4) sandy clay loam; many, coarse, faint mottles of grayish brown (10YR 5/2), and many, medium, prominent mottles of yellowish red (5YR 4/8); weak, medium, subangular blocky structure; friable, sticky and slightly plastic; common roots; sand grains are filmed and bridged with clay; extremely acid; clear, smooth boundary.

B3—25 to 37 inches, yellowish-brown (10YR 5/4) sandy loam; many, coarse, faint mottles of grayish brown (10YR 5/2) and many, coarse, prominent mottles of yellowish-red (5YR 4/8); weak, medium, blocky structure with traces of platiness; firm, slightly sticky; few roots; extremely acid; clear, wavy boundary.

C—37 to 60 inches, light yellowish-brown (10YR 6/4) loamy fine sand; common, coarse, faint mottles of light brownish gray (10YR 6/2) and some streaks of strong brown (7.5YR 5/8); single grain; loose; grades to sand with depth; extremely acid.

The hue throughout the profile is 10YR or 2.5Y, or may range to 5Y in the C horizon.

In the A horizon, the value ranges from 2 to 6 and the chroma from 1 to 4. Values of 2 and 3 are limited to undisturbed A1 horizons less than 6 inches thick. The texture of the A horizon is loam or sandy loam.

In the B horizon, the matrix value is 5 or 6 and the matrix chroma ranges from 4 to 8. There are always mottles with chroma of 2 or less in the lower part of the Bt horizon. High-chroma mottling occurs in places. The Bt horizon generally

is sandy clay loam, but may be loam or sandy loam in part. It is 18 to 27 percent clay and 20 to 35 percent silt.

The C horizon generally has a higher value and a lower chroma than the B horizon, and it lacks mottling in some profiles. The texture of the C horizon ranges from sandy loam to sand.

The solum ranges from about 24 to 42 inches in thickness. Some profiles contain as much as 10 percent fine smooth pebbles in the solum, or as much as 20 percent in the C horizon, or both.

Woodstown soils contain less mica and more sand than the Delanco soils, and are more sandy in the Bt horizon than the Mattapex soils. Woodstown soils do not have the fragipan or hardpan lower subsoils that characterize Aldino, Beltsville, Captina, and Glenville soils. They formed in the same kind of sediment as the well-drained Sassafras soils and the poorly drained Fallsington soils.

Woodstown sandy loam, 0 to 2 percent slopes (WdA).—This soil has the profile described as representative of the series. The soil is suited to cultivated crops, pasture, and trees. Artificial drainage is needed for most crops, except for some that are planted late. Capability unit IIw-5; woodland subclass 2o.

Woodstown sandy loam, 2 to 5 percent slopes (WdB).—This soil has a profile similar to that described as representative of the series. Included in mapping of this soil are some moderately eroded and a few severely eroded soils, and a few acres of soils that have slopes of more than 5 percent. The soil is suited to cultivated crops, pasture, and trees. If cultivated regularly, it needs to be protected against erosion. Drainage, or at least spot drainage, is needed for some crops. Capability unit IIe-36; woodland subclass 2o.

Woodstown loam, 0 to 2 percent slopes (WoA).—The surface layer of this soil contains more silt and less sand than the surface layer of Woodstown sandy loam. It also retains moisture and plant nutrients better but is later to dry and warm. The soil is suited to cultivated crops, pasture, and trees. It needs artificial drainage for most crops. Capability unit IIw-1; woodland subclass 2o.

Woodstown loam, 2 to 5 percent slopes (WoB).—This soil has a profile similar to the one described as representative of the series. Included in mapping of this soil are a few gravelly and a few moderately eroded soils. Also included are a few acres that have slopes of more than 5 percent. The hazard of erosion is moderate where the soil is cultivated. Drainage, or at least spot drainage, is needed in places except for those crops planted late. Capability unit IIe-16; woodland subclass 2o.

Use and Management of the Soils

The first part of this section discusses use of the soils for farming. It describes major management problems and explains how soils are grouped according to their capability. Estimated average yields of principal crops are provided in the second part of this section. Other parts discuss use of the soils as woodland, wildlife management, engineering uses of the soils, and suitability of the soils for recreational uses.

Use of the Soils for Farming

Baltimore County ranks among the top three counties in number of farms in Maryland despite the recent growth of residential areas. Diversified farming covers 133,198 areas in the County. There are several major soil limitations that affect the use and management of this land for farming. These limitations are erosion hazard, wetness, and root zone limitation.

Erosion hazard.—Approximately 78 percent of the land area of Baltimore County is subject to gullying and sheet erosion if not managed properly. Sheet erosion is the most prevalent and presents the greatest concern to management as it is difficult to recognize and its economic loss is hard to evaluate. Most erosion in the county can be controlled by good management that includes field stripcropping, contour farming, crop rotation, use of grasses and legumes, plant residue management, cover crops, diversions and terraces, and minimum tillage.

Wetness.—Approximately 10 percent of the land area in Baltimore County consists of soils that are wet throughout much of the year. Poor soil drainage, slow runoff of surface water, seepage at the base of steeper slopes, high water tables, and stream overflow are the chief causes of wetness.

Most wet soils in Baltimore County can be artificially drained to provide better crop environment. Soils of the Fallsington, Pocomoke, and Woodstown series that have moderately permeable subsoils can be drained by tile, perforated pipe, or tubing.

Wet soils that are nearly level to gently sloping and have slowly permeable subsoils such as Baile, Watchung, Lenoir, Elkton, Othello, and Leonardtown soils generally can be effectively drained by surface ditches and land shaping.

More specific information concerning the kind of drainage that is recommended for specific soils, depth and spacing of drains, side slope gradients, and other related data can be found in the "Drainage Guide for Maryland," a mimeographed publication produced in 1970 in cooperation with the University of Maryland College of Agriculture.

The soils of Baltimore County generally are low in natural fertility and need commercial fertilizer. The degree to which these fertilizers can be absorbed by the soil and subsequently given up for plant use varies greatly with the soil type. The same is true for moisture. In the sandier Galestown and Fort Mott soils, moisture is not retained well and fertilizer generally is leached or washed through to underlying strata quite rapidly. In shallow soils such as Chrome, severely eroded, bedrock is so close to the surface that little soil remains to retain moisture. Well-structured soils that contain some clay in their subsoil, such as Hagerstown, Baltimore, Elioak, and Chester, retain heavy applications of fertilizer. These soils also retain more moisture for plant use than the sandier and more shallow soils.

Most of the soils in Baltimore County are naturally acid. Soils that are more than slightly acid need lime to free fertilizer elements. For the maintenance of productivity, all soils of the county should have a continuous lime and fertilizer program. To obtain maximum plant growth lime and fertilizer should be applied in amounts determined by soil tests.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups

are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or for engineering.

In the capability system, all kinds of soils are grouped at three levels, the capability class, subclass, and unit. These are discussed in the following paragraphs.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. In class I are the soils that have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In class VIII are soils and landforms so rough, so shallow, or otherwise so limited that they do not produce worthwhile yields of crops, forage, or wood products.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-7. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

The eight classes in the capability system and the subclasses and units in Baltimore County are described in the list that follows. Capability units are not numbered consecutively because a statewide system is used for numbering the units, and not all units are represented in the county. Unit designations for soils in the county can be found in the "Guide to Mapping Units." Soil complexes that include Urban land or Made land as a major part were not placed in capability units.

Class I. Soils that have few limitations that restrict their use. (No subclasses)

- Unit I-1. Nearly level, deep, well-drained, silt loam soils that formed in material influenced by limestone.
- Unit I-4. Nearly level, deep, well-drained, loam and silt loam soils derived from acid and basic rocks and acid sediment.
- Unit I-5. Nearly level, deep, well-drained, sandy loam soils that formed in acid sediment.
- Unit I-6. Nearly level, deep, well-drained, silt loam soils that formed in acid sediment; on flood plains.

Class II. Soils that have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Subclass IIe. Soils subject to moderate erosion if not protected.

- Unit IIe-1. Gently sloping, deep, well-drained, silt loam soils that formed in material influenced by limestone.
- Unit IIe-4. Gently sloping, deep, well-drained, loam, channery loam, gravelly loam, silt loam, and gravelly silt loam soils derived from acid and basic rocks and acid sediment.
- Unit IIe-5. Nearly level to gently sloping, deep, well-drained, sandy loam and fine sandy loam soils that formed in acid sediment.
- Unit IIe-10. Gently sloping, shallow to deep, well-drained to excessively drained, loam and silt loam soils derived from acid and basic rocks.
- Unit IIe-13. Gently sloping, deep, moderately well drained, silt loam soils that have a fragipan and that formed in acid sediment.
- Unit IIe-14. Gently sloping, moderately deep to deep, moderately well drained, silt loam soils that have a fragipan and that formed in material weathered from serpentine rock.
- Unit IIe-16. Gently sloping, deep, moderately well drained and somewhat poorly drained, loam and silt loam soils that formed in acid sediment.
- Unit IIe-24. Gently sloping, deep, well-drained, loam soils that formed in material influenced by limestone.
- Unit IIe-25. Gently sloping, deep, well-drained and somewhat excessively drained, loam and channery loam soils that formed in material weathered from acid micaceous rocks or from limestone schist.
- Unit IIe-36. Gently sloping, deep, moderately well drained, sandy loam soils that formed in acid sediment.

Unit IIe-42. Gently sloping, deep, well-drained, loam soils that formed in acid, clayey sediment.

Subclass IIw. Soils that have moderate limitations because of excess water.

Unit IIw-1. Nearly level, deep, moderately well drained and somewhat poorly drained, loam and silt loam soils that formed in acid sediment.

Unit IIw-2. Nearly level, moderately deep to deep, moderately well drained, silt loam soils that have a fragipan and that formed in material weathered from serpentine rock.

Unit IIw-5. Nearly level, deep, moderately well drained, sandy loam soils that formed in acid sediment.

Unit IIw-7. Nearly level, deep, moderately well drained and somewhat poorly drained, silt loam soils that formed in recent alluvium; on flood plains.

Unit IIw-8. Nearly level, deep, moderately well drained, silt loam soils that have a fragipan and that formed in acid sediment.

Subclass IIs. Soils that have moderate limitations of moisture capacity.

Unit IIs-4. Nearly level to gently sloping, deep, well-drained and somewhat excessively drained, loamy sand and gravelly sandy loam soils that formed in acid sandy sediment.

Unit IIs-7. Gently sloping, deep, well-drained, silt loam soils that formed in acid silty sediment.

Class III. Soils that have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Subclass IIIe. Soils subject to severe erosion if cultivated and not protected.

Unit IIIe-1. Moderately sloping, deep, well-drained, silt loam soils that formed in material influenced by limestone.

Unit IIIe-4. Moderately sloping, deep, well-drained loam, channery loam, gravelly loam, silt loam, and gravelly silt loam soils derived from acid and basic rocks and acid sediment.

Unit IIIe-5. Moderately sloping, deep, well-drained, sandy loam soils that formed in acid sediment.

Unit IIIe-7. Moderately sloping, deep, well-drained, silt loam soils that formed in acid silty sediment.

Unit IIIe-10. Gently sloping to moderately sloping, moderately deep to deep, well-drained to excessively drained, loam, channery loam, and silt loam soils derived from acid and basic rocks.

Unit IIIe-13. Moderately sloping, deep, moderately well drained, silt loam soils that have a fragipan and that formed in acid sediment.

Unit IIIe-14. Moderately sloping, moderately deep to deep, moderately well drained, silt loam soils that have a fragipan and that formed in material weathered from serpentine rock.

Unit IIIe-24. Moderately sloping, deep, well-drained loam soils that formed in material influenced by limestone.

Unit IIIe-25. Moderately sloping, deep, well-drained and somewhat excessively drained, loam and channery loam soils that formed in material weathered from acid micaceous rocks or limestone schist.

Unit IIIe-33. Moderately sloping, deep, well-drained to excessively drained, gravelly sandy loam soils that formed in acid sediment.

Unit IIIe-34. Moderately sloping, deep, somewhat poorly drained, silt loam soils that formed in old, clayey, marine sediment.

Unit IIIe-42. Moderately sloping, deep, well-drained, loam soils and nearly level and gently sloping areas of loamy and clayey land; formed in acid clayey sediment.

Subclass IIIw. Soils that have severe limitations because of excess water.

Unit IIIw-1. Nearly level, deep, somewhat poorly drained, silt loam soils that formed in acid sediment.

Unit IIIw-3. Nearly level, deep, poorly drained, silt loam soils that formed in alluvium derived from soils influenced by limestone.

Unit IIIw-5. Nearly level to gently sloping, deep, somewhat poorly drained, loam and silt loam soils that formed in old clayey marine sediment.

Unit IIIw-6. Nearly level, deep, poorly drained and very poorly drained, sandy loam soils that formed in acid sediment.

Unit IIIw-7. Nearly level, deep, poorly drained, loam and silt loam soils that formed in acid sediment.

Unit IIIw-9. Nearly level, deep, poorly drained, loam and silt loam soils that formed in old clayey marine sediment.

Subclass IIIs. Soils that have severe limitations of moisture capacity.

Unit IIIs-1. Nearly level to gently sloping, deep, somewhat excessively drained, loamy sand soils that formed in acid sediment.

Class IV. Soils that have very severe limitations that restrict the choice of plants, require very careful management, or both.

Subclass IVe. Soils subject to very severe erosion if they are cultivated and not protected.

Unit IVe-3. Moderately sloping to strongly sloping, deep, well-drained, loam, channery loam, and silty clay loam soils that formed in material weathered from acid rocks.

Unit IVe-5. Moderately sloping, deep, well-drained to excessively drained, sandy loam and gravelly sandy loam soils that formed in acid sandy and gravelly sediment.

Unit IVe-7. Moderately sloping, deep, well-drained, silt loam soils that formed in acid silty sediment.

Unit IVe-9. Moderately sloping, deep, somewhat poorly drained, silty clay loam soils that formed in old clayey marine sediment.

Unit IVe-10. Moderately sloping and strongly sloping, moderately deep to deep, well-drained to excessively drained, channery loam, gravelly loam, silt loam, and silty clay loam soils that formed in material weathered from acid and basic rocks.

Unit IVe-25. Moderately sloping and strongly sloping, deep, well-drained and somewhat excessively drained, loam and channery loam soils that formed in material weathered from acid micaceous rocks.

Subclass IVw. Soils limited by excess wetness.

Unit IVw-3. Nearly level to moderately sloping, deep to moderately deep, very poorly drained to somewhat poorly drained, silt loam soils that formed in material influenced by limestone and in old, acid, silty sediment.

Subclass IVs. Soils limited by droughtiness.

Unit IVs-1. Moderately sloping, deep, somewhat excessively drained, loamy sand soils that formed in acid sediment.

Class V. Soils that are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, woodland, or wildlife.

Subclass Vw. Soils too wet for cultivation; drainage generally not feasible.

Unit Vw-1. Nearly level, deep, poorly drained, silt loam soils that formed in material weathered from acid and basic rocks.

Class VI. Soils that have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture, woodland, or wildlife.

Subclass VIe. Soils severely limited, mainly by hazard of erosion, if protective cover is not maintained.

Unit VIe-2. Gently sloping to moderately sloping and strongly sloping to steep, deep soils, loamy and clayey land that formed in acid, sandy, gravelly, and clayey sediment.

Unit VIe-3. Strongly sloping to steep, deep to moderately deep, well-drained to excessively drained soils of variable texture that formed in material weathered from acid and basic rock.

Subclass VIw. Soils that are severely limited by excess water and generally are unsuited to cultivation.

Unit VIw-1. Alluvial land subject to frequent flooding.

Unit VIw-2. Gently sloping, deep, poorly drained, silt loam soils that formed in material weathered from acid and basic rock.

Subclass VIs. Soils generally unsuited to cultivation and limited for other uses because of available moisture capacity, stones, or other features.

Unit VIs-2. Gently sloping to moderately sloping, deep, well-drained, rocky loam soils that formed in material influenced by limestone.

Unit VIs-3. Gently sloping to strongly sloping, moderately deep to deep, moderately well drained to somewhat excessively drained, stony soils that formed in material weathered from acid and basic rocks.

Unit VIs-32. Gently sloping to moderately sloping, shallow to moderately deep, well-drained, channery silty clay loam soils that formed in material weathered from serpentine rock.

Class VII. Soils that have severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture, woodland, or wildlife.

Subclass VIIe. Soils very severely limited, chiefly by hazard of erosion, if protective cover is not maintained.

Unit VIIe-2. Loamy and clayey land that is strongly sloping to steep.

Unit VIIe-3. Strongly sloping, moderately deep, somewhat excessively drained, channery loam soils that formed in material weathered from acid micaceous rocks.

Subclass VIIw. Soils very severely limited by excess water.

Unit VIIw-1. Swamp areas that are mostly heavily wooded.

Subclass VIIs. Soils very severely limited by available moisture capacity, stones, or other soil features.

Unit VIIs-3. Steep, moderately deep to deep, well-drained to excessively drained, stony soils that formed in material weathered from acid and basic rocks.

Unit VIIs-4. Nearly level to moderately sloping, moderately deep to deep, poorly drained to somewhat poorly drained, stony soils that formed in material weathered from basic rocks.

Unit VIIs-32. Strongly sloping to steep, shallow to moderately deep, well-drained, channery silty clay loam soils that formed in material weathered from serpentine rock.

Class VIII. Soils and landforms that have limitations that preclude their use for commercial production of plants.

Subclass VIIIw. Extremely wet marsh land.

Unit VIIIw-1. Tidal marsh.

Subclass VIIIs. Stony land and miscellaneous land areas that have little potential for commercial production of vegetation.

Unit VIIIs-1. Stony land, steep.

Unit VIIIs-2. Coastal beaches.

Unit VIIIs-4. Clay pits, mine dumps and quarries, and sand and gravel pits.

Estimated yields

Table 2 gives the estimates of the average yields of the principal crops grown in Baltimore County under improved or high-level management. Yields are averages that are normal over a period of years having a wide range of rainfall and other climatic conditions. Yields listed are those that are expected by following the best current management practices. These include:

1. Application of lime on the basis of needs indicated by reliable soil tests.

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2. Application of fertilizer on the basis of needs indicated by reliable soil tests.
3. Adequate control of weeds, insects and disease by the most practical methods.
4. Use of certified seed of the most advanced and reliable variety that has been treated for fungus and disease control, and seeding at rates designed to produce good crop growth.
5. Proper management of tillage operations to include limiting number of trips over a field to those absolutely essential to produce a crop, timing of tillage operations to prevent compaction of moist soil, and use of crop residues to improve tilth and moisture-retaining properties.
6. Use of rotations and cover crops to control weeds, improve moisture retaining properties and tilth of the soil, help control diseases, lessen effects of erosion, and maintain content of organic matter.
7. Contour farming, stripcropping, diversion terraces, grassed waterways, and similar practices that help control erosion, prevent runoff of useable water, and increase moisture retention in the soil.
8. Adequate drainage of wet soils to prevent crop flooding, allow better aeration, and reduce the water table to a depth that will not hinder crop growth.

Yields listed are average goals and do not mean maximum possible yields. Many soils in the county are capable of producing more than 150 bushels of corn per acre in a given year. However, yields vary on the same soil from year to year depending on management, weather, insects and diseases, etc. Yields listed in table 2 indicate what is practical for a farmer to produce over a number of years under varying conditions using better than average management.

As farm technology advances, crop yields on soils of the county should show an upward trend. Yields listed in table 2 reflect the status of technology in the late 1960's. Adjustments upward should be made in succeeding years to keep abreast of current technology. Yield differences between different soils should remain the same.

TABLE 2.—*Estimated average per-acre yields of specified crops under improved or high-level management*

[Absence of a figure indicates crop is not suited to the soil specified or is not commonly grown on it]

Soil	Corn		Oats	Wheat	Soybeans	Hay		Pasture	
	Grain	Silage				Alfalfa-grass	Clover-grass	Bluegrass	Legume-tall grass
	Bu.	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Aldino silt loam, 0 to 3 percent slopes	105	21	65	45		3.5	3.0	135	200
Aldino silt loam, 3 to 8 percent slopes, moderately eroded	105	21	65	45		3.5	3.0	135	200
Aldino silt loam, 8 to 15 percent slopes, moderately eroded	100	20	60	40		3.5	3.0	135	200
Aldino very stony silt loam, 0 to 15 percent slopes								110	
Aldino-Urban land complex, 0 to 8 percent slopes [2]									
Alluvial land [3]									
Baile silt loam, 0 to 3 percent slopes							2.0		1
Baile silt loam, 3 to 8 percent slopes							2.0		115
Baltimore silt loam, 0 to 3 percent slopes	135	27	80	50	45	5.5	3.5	160	315
Baltimore silt loam, 3 to 8 percent slopes, moderately eroded	135	27	80	50	45	5.5	3.5	160	315
Baltimore silt loam, 8 to 15 percent slopes, moderately eroded	125	25	75	45		5.0	3.5	160	285
Baltimore-Urban land complex, 0 to 8 percent slopes [2]									
Barclay silt loam	120	24			40		3.5		255
Beltsville silt loam, 0 to 2 percent slopes	95	19		45	35		3.0		170
Beltsville silt loam, 2 to 5 percent slopes	95	19		45	35		3.0		170
Beltsville silt loam, 5 to 10 percent slopes, moderately eroded	80	16		40	30		3.0		170
Beltsville-Urban land complex, 0 to 5 percent slopes [2]									
Beltsville-Urban land complex, 5 to 10 percent slopes [2]									
Brandywine loam, 3 to 8 percent slopes, moderately eroded	85	17	60	35		3.5	3.0	135	200
Brandywine loam, 8 to 15 percent slopes, moderately eroded	75	15	55	35		3.0	2.5	115	170
Brandywine gravelly loam, 15 to 25 percent slopes, moderately eroded	70	14	50	30		3.0	2.0	90	170

See footnotes at end of table.

TABLE 2.—*Estimated average per-acre yields of specified crops under improved or high-level management*—Continued

Soil	Corn		Oats	Wheat	Soybeans	Hay		Pasture	
	Grain	Silage				Alfalfa-grass	Clover-grass	Bluegrass	Legume-tall grass
	Bu.	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Brandywine gravelly loam, 15 to 25 percent slopes, severely eroded								80	
Brandywine gravelly loam, 25 to 45 percent slopes								80	
Captina silt loam, 0 to 3 percent slopes	100	20	65	40	35	3.5	3.0	135	200
Captina silt loam, 3 to 8 percent slopes, moderately eroded	100	20	65	40	35	3.5	3.0	135	200
Chester silt loam, 0 to 3 percent slopes	135	27	80	50	45	5.5	3.5	160	315
Chester silt loam, 3 to 8 percent slopes, moderately eroded	135	27	80	50	45	5.5	3.5	160	315
Chester silt loam, 8 to 15 percent slopes, moderately eroded	125	25	75	45	35	5.5	3.5	160	285
Chester gravelly silt loam, 3 to 8 percent slopes, moderately eroded	135	27	80	50	45	5.5	3.5	160	315
Chester gravelly silt loam, 8 to 15 percent slopes, moderately eroded	125	25	75	45	35	5.5	3.5	160	285
Chillum silt loam, 2 to 5 percent slopes, moderately eroded	130	26		50	45	5.0	3.5		285
Chillum silt loam, 5 to 10 percent slopes, moderately eroded	120	24		45	40	4.5	3.5		255
Chillum silt loam, 5 to 10 percent slopes, severely eroded	100	20		40		4.0	3.0		230
Chillum-Neshaminy silt loams, 2 to 5 percent slopes, moderately eroded	130	26		50	45	5.0	3.5		285
Chillum-Neshaminy silt loams, 5 to 10 percent slopes, moderately eroded	120	24		45	40	4.5	3.5		255
Chillum-Neshaminy gravelly silt loams, 10 to 15 percent slopes, moderately eroded	100	20		40		4.0	3.0		230
Chillum-Urban land complex, 0 to 5 percent slopes [2]									
Chillum-Urban land complex, 5 to 15 percent slopes [2]									
Christiana loam, 2 to 5 percent slopes	115	23		45	40	4.0	3.0		230
Christiana loam, 5 to 10 percent slopes, moderately eroded	105	21		40	35	4.0	3.0		230
Chrome silt loam, 3 to 8 percent slopes, moderately eroded	85	17	60	35		3.5	3.0	135	200
Chrome channery silty clay loam, 3 to 15 percent slopes, severely eroded						3.0	2.0	90	170
Chrome channery silty clay loam, 15 to 45 percent slopes, severely eroded									
Clay pits [4]									
Coastal beaches [4]									
Codorus silt loam	130	26	80	45	45	4.5	3.5	160	255
Comus silt loam	140	28	80	50	45	5.5	3.5	160	315
Conestoga loam, 3 to 8 percent slopes, moderately eroded	135	27	80	50	45	5.5	3.5	160	315
Conestoga loam, 8 to 15 percent slopes, moderately eroded	125	25	75	45	35	5.0	3.5	160	285
Delanco silt loam, 3 to 8 percent slopes	120	24	75	45	35	4.5	3.5	160	255
Dunning silt loam	110	22					3.5	160	205
Edgemont gravelly loam, 3 to 8 percent slopes, moderately eroded	125	25	75	45	35	4.5	3.5	160	255
Edgemont gravelly loam, 8 to 15 percent slopes, moderately eroded	115	23	70	40	30	4.5	3.5	160	255
Edgemont very stony loam, 8 to 25 percent slopes								110	
Edgemont very stony loam, 25 to 45 percent slopes									
Elioak silt loam, 3 to 8 percent slopes, moderately eroded	135	27	80	50	45	5.5	3.5	160	315
Elioak silt loam, 8 to 15 percent slopes, moderately eroded	125	25	75	45	35	5.0	3.5	160	285
Elioak gravelly silt loam, 3 to 8 percent slopes, moderately eroded	135	27	80	50	45	5.5	3.5	160	315
Elioak gravelly silt loam, 8 to 15 percent slopes, moderately eroded	125	25	75	45	35	5.0	3.5	160	285

See footnotes at end of table.

TABLE 2.—*Estimated average per-acre yields of specified crops under improved or high-level management*—Continued

Soil	Corn		Oats	Wheat	Soybeans	Hay		Pasture	
	Grain	Silage				Alfalfa-grass	Clover-grass	Bluegrass	Legume tall grass
	Bu.	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Elioak silty clay loam, 8 to 15 percent slopes, severely eroded	110	22	65	40	----	4.5	3.0	135	255
Elkton loam	105	21	----	----	40	----	3.5	----	200
Elkton silt loam	105	21	----	----	40	----	3.5	----	200
Elkton-Urban land complex [2]	----	----	----	----	----	----	----	----	----
Elsinboro loam, 3 to 8 percent slopes	130	26	80	50	45	5.0	3.5	160	285
Elsinboro loam, 8 to 15 percent slopes, moderately eroded	120	24	75	45	35	4.5	3.5	160	255
Fallsington sandy loam	120	24	----	----	35	----	3.0	----	170
Fallsington loam	120	24	----	----	35	----	3.0	----	170
Fort Mott loamy sand, 0 to 5 percent slopes	100	20	----	40	30	3.0	2.5	----	155
Galestown loamy sand, 0 to 5 percent slopes	70	14	----	30	20	2.5	2.0	----	145
Galestown loamy sand, 5 to 10 percent slopes	60	12	----	25	----	2.5	2.0	----	145
Glenelg loam, 3 to 8 percent slopes, moderately eroded	135	27	80	50	45	5.5	3.5	160	315
Glenelg loam, 8 to 15 percent slopes, moderately eroded	125	25	75	45	----	5.0	3.5	160	285
Glenelg loam, 8 to 15 percent slopes, severely eroded	110	22	65	40	----	4.5	3.0	135	255
Glenelg loam, 15 to 25 percent slopes, moderately eroded	110	22	65	40	----	4.5	3.0	135	255
Glenelg loam, 15 to 25 percent slopes, severely eroded	----	----	----	----	----	----	----	115	----
Glenelg channery loam, 3 to 8 percent slopes, moderately eroded	135	27	80	50	45	5.5	3.5	160	315
Glenelg channery loam, 8 to 15 percent slopes, moderately eroded	125	25	75	45	----	5.0	3.5	160	285
Glenelg channery loam, 15 to 25 percent slopes, moderately eroded	110	22	65	40	----	4.5	3.0	135	255
Glenelg channery loam, 15 to 25 percent slopes, severely eroded	----	----	----	----	----	----	----	115	----
Glenelg-Urban land complex, 0 to 8 percent slopes [2]	----	----	----	----	----	----	----	----	----
Glenelg-Urban land complex, 8 to 15 percent slopes [2]	----	----	----	----	----	----	----	----	----
Glenville silt loam, 0 to 3 percent slopes	100	20	65	40	35	3.5	3.0	135	200
Glenville silt loam, 3 to 8 percent slopes	100	20	65	40	35	3.5	3.0	135	200
Glenville-Urban land complex, 0 to 8 percent slopes [2]	----	----	----	----	----	----	----	----	----
Hagerstown silt loam, 0 to 3 percent slopes	135	27	80	50	45	5.5	3.5	160	315
Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded	135	27	80	50	45	5.5	3.5	160	315
Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded	125	25	75	45	----	5.0	3.5	160	285
Hatboro silt loam	115	23	----	----	----	----	3.5	----	200
Hollinger loam, 3 to 8 percent slopes, moderately eroded	95	19	65	40	----	4.0	3.0	135	230
Hollinger loam, 8 to 15 percent slopes, moderately eroded	90	18	60	35	----	4.0	3.0	135	230
Hollinger and Conestoga loams, 15 to 25 percent slopes, severely eroded	----	----	----	----	----	----	----	95	----
Hollinger and Conestoga very rocky loams, 3 to 15 percent slopes	----	----	----	----	----	----	----	95	----
Iuka silt loam	130	26	80	45	45	4.5	3.5	160	255
Joppa gravelly sandy loam, 2 to 5 percent slopes	100	20	----	45	35	3.5	3.0	----	200
Joppa gravelly sandy loam, 5 to 10 percent slopes, moderately eroded	90	18	----	40	30	3.0	2.5	----	170
Joppa gravelly sandy loam, 10 to 15 percent slopes, moderately eroded	80	16	----	35	----	3.0	2.5	----	170
Joppa-Urban land complex, 5 to 15 percent slopes [2]	----	----	----	----	----	----	----	----	----
Kelly silt loam, 3 to 8 percent slopes, moderately eroded	70	14	50	----	----	----	2.5	115	170
Kelly silt loam, 8 to 15 percent slopes, moderately eroded	60	12	50	----	----	----	2.0	90	115
Kelly very stony silt loam, 0 to 15 percent slopes	----	----	----	----	----	----	----	----	----
Kelly-Urban land complex, 0 to 8 percent slopes [2]	----	----	----	----	----	----	----	----	----

See footnotes at end of table.

TABLE 2.—*Estimated average per-acre yields of specified crops under improved or high-level management*—Continued

Soil	Corn		Oats	Wheat	Soybeans	Hay		Pasture	
	Grain	Silage				Alfalfa-grass	Clover-grass	Bluegrass	Legume-tall grass
	Bu.	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Legore silt loam, 3 to 8 percent slopes, moderately eroded	95	19	65	40	----	3.5	3.0	135	200
Legore silt loam, 8 to 15 percent slopes, moderately eroded	90	18	60	35	----	3.0	2.5	115	170
Legore silt loam, 15 to 25 slopes, moderately eroded	80	16	55	30	----	3.0	2.0	90	170
Legore silt loam, 25 to 45 percent slopes	----	----	----	----	----	----	----	80	----
Legore very stony silt loam, 3 to 15 percent slopes	----	----	----	----	----	----	----	90	----
Legore very stony silt loam, 15 to 25 percent slopes	----	----	----	----	----	----	----	70	----
Legore very stony silt loam, 25 to 45 percent slopes	----	----	----	----	----	----	----	----	----
Legore silty clay loam, 8 to 15 percent slopes, severely eroded	80	16	55	30	----	3.0	2.0	90	170
Legore silty clay loam, 15 to 25 percent slopes, severely eroded	----	----	----	----	----	----	----	80	----
Legore-Urban land complex, 0 to 8 percent slopes [2]	----	----	----	----	----	----	----	----	----
Legore-Urban land complex, 8 to 15 percent slopes [2]	----	----	----	----	----	----	----	----	----
Lenoir loam, 0 to 5 percent slopes	110	22	----	40	40	----	3.0	----	170
Lenoir silt loam, 0 to 5 percent slopes	110	22	----	40	40	----	3.0	----	170
Lenoir silt loam, 5 to 12 percent slopes, moderately eroded	90	18	----	35	30	----	3.0	----	170
Lenoir silty clay loam, 5 to 12 percent slopes, severely eroded	----	----	----	----	----	----	----	----	115
Lenoir-Urban land complex, 0 to 5 percent slopes [2]	----	----	----	----	----	----	----	----	----
Leonardtown silt loam	70	14	----	----	25	----	2.5	----	145
Lindside silt loam	130	26	80	45	45	4.5	3.5	160	255
Loamy and clayey land, 0 to 5 percent slopes	85	17	----	35	30	3.5	3.0	----	200
Loamy and clayey land, 5 to 15 percent slopes	----	----	----	----	----	----	----	----	150
Loamy and clayey land, 15 to 40 percent slopes	----	----	----	----	----	----	----	----	----
Made land [4]	----	----	----	----	----	----	----	----	----
Manor loam, 3 to 8 percent slopes, moderately eroded	95	19	65	40	----	3.5	3.0	135	200
Manor loam, 8 to 15 percent slopes, moderately eroded	90	18	60	35	----	3.0	2.5	115	170
Manor loam, 8 to 15 percent slopes, severely eroded	80	16	55	30	----	3.0	2.0	90	170
Manor loam, 15 to 25 percent slopes, moderately eroded	80	16	55	30	----	3.0	2.0	90	170
Manor loam, 15 to 25 percent slopes, severely eroded	----	----	----	----	----	----	----	80	----
Manor channery loam, 3 to 8 percent slopes, moderately eroded	95	19	65	40	----	3.5	3.0	135	200
Manor channery loam, 8 to 15 percent slopes, moderately eroded	90	18	60	35	----	3.0	2.5	115	170
Manor channery loam, 8 to 15 percent slopes, severely eroded	80	16	55	30	----	3.0	2.0	90	170
Manor channery loam, 15 to 25 percent slopes, moderately eroded	80	16	55	30	----	3.0	2.0	90	170
Manor channery loam, 15 to 25 percent slopes, severely eroded	----	----	----	----	----	----	----	80	----
Manor soils, 25 to 50 percent slopes	----	----	----	----	----	----	----	80	----
Manor-Urban land complex, 15 to 25 percent slopes [2]	----	----	----	----	----	----	----	----	----
Manor and Glenelg very stony loams, 3 to 15 percent slopes	----	----	----	----	----	----	----	90	----
Manor and Brandywine very stony loams, 15 to 25 percent slopes	----	----	----	----	----	----	----	70	----
Manor and Brandywine very stony loams, 25 to 65 percent slopes	----	----	----	----	----	----	----	----	----
Matapeake silt loam, 0 to 2 percent slopes	140	28	----	50	45	5.5	3.5	----	315
Matapeake silt loam, 2 to 5 percent slopes	140	28	----	50	45	5.5	3.5	----	315
Matapeake silt loam, 5 to 12 percent slopes, moderately eroded	130	26	----	45	40	5.0	3.5	----	285
Mattapex silt loam, 0 to 2 percent slopes	135	27	----	45	45	4.5	3.5	----	255
Mattapex silt loam, 2 to 5 percent slopes	135	27	----	45	45	4.5	3.5	----	255
Mattapex-Urban land complex, 0 to 5 percent slopes [2]	----	----	----	----	----	----	----	----	----
Melvin silt loam	115	23	----	----	----	----	3.5	----	200

See footnotes at end of table.

TABLE 2.—*Estimated average per-acre yields of specified crops under improved or high-level management*—Continued

Soil	Corn		Oats	Wheat	Soybeans	Hay		Pasture	
	Grain	Silage				Alfalfa-grass	Clover-grass	Bluegrass	Legume-tall grass
	Bu.	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Melvin silt loam, local alluvium	115	23					3.5		200
Mine dumps and quarries [4]									
Montalto silt loam, 3 to 8 percent slopes, moderately eroded	135	27	80	50	45	5.5	3.5	160	315
Montalto silt loam, 8 to 15 percent slopes, moderately eroded	125	25	75	45	35	5.0	3.5	160	285
Mt. Airy channery loam, 3 to 8 percent slopes, moderately eroded	85	17	60	35		3.5	3.0	135	200
Mt. Airy channery loam, 8 to 15 percent slopes, moderately eroded	75	15	55	35		3.0	2.5	115	170
Mt. Airy channery loam, 15 to 25 percent slopes, moderately eroded								90	
Mt. Airy channery loam, 15 to 25 percent slopes, severely eroded									
Neshaminy silt loam, 3 to 8 percent slopes, moderately eroded	135	27	80	50	45	5.5	3.5	160	315
Neshaminy silt loam, 8 to 15 percent slopes moderately eroded	125	25	75	45	35	5.0	3.5	160	285
Othello silt loam	115	23			40		3.5		200
Pocomoke sandy loam	110	22			40		3.5		200
Relay silt loam, 8 to 15 percent slopes, moderately eroded	90	18	60	35		3.0	2.5	115	170
Relay silt loam, 15 to 25 percent slopes, moderately eroded	80	16	55	30		3.0	2.0	90	170
Relay very stony silt loam, 3 to 25 percent slopes								70	
Relay very stony silt loam, 25 to 65 percent slopes									
Relay clay loam, 15 to 25 percent slopes, severely eroded								80	
Sand and gravel pits [4]									
Sassafras sandy loam, 0 to 2 percent slopes	130	26		50	45	5.5	3.5		315
Sassafras sandy loam, 2 to 5 percent slopes	130	26		50	45	5.5	3.5		315
Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded	120	24		45	40	5.0	3.5		285
Sassafras sandy loam, 5 to 10 percent slopes, severely eroded	100	20		40		4.5	3.0		255
Sassafras sandy loam, 10 to 15 percent slopes, moderately eroded	100	20		40		4.5	3.0		255
Sassafras loam, 0 to 2 percent slopes	130	26		50	45	5.5	3.5		315
Sassafras loam, 2 to 5 percent slopes	130	26		50	45	5.5	3.5		315
Sassafras loam, 5 to 10 percent slopes, moderately eroded	120	24		45	40	5.0	3.5		285
Sassafras-Urban land complex, 0 to 5 percent slopes [2]									
Sassafras and Joppa soils, 5 to 15 percent slopes, severely eroded									230
Sassafras and Joppa soils, 15 to 30 percent slopes									
Stony land, steep [4]									
Sunnyside fine sandy loam, 0 to 5 percent slopes, moderately eroded	135	27		50	45	5.5	3.5		315
Swamp [4]									
Tidal marsh [4]									
Watchung silt loam, 0 to 3 percent slopes							2.0		115
Watchung silt loam, 3 to 8 percent slopes							2.0		115
Watchung very stony silt loam, 0 to 8 percent slopes									
Woodstown sandy loam, 0 to 2 percent slopes	130	26		40	40	4.5	3.5		255
Woodstown sandy loam, 2 to 5 percent slopes	130	26		40	40	4.5	3.5		255
Woodstown loam, 0 to 2 percent slopes	130	26		40	40	4.5	3.5		255
Woodstown loam, 2 to 5 percent slopes	130	26		40	40	4.5	3 5		255

[1] Cow-acre-days is a term used to express the carrying capacity of pasture. It is the number of days the pasture can be grazed during a single season without injury to the sod. An acre of pasture that provides 100 days of grazing for two cows, for example, has a carrying capacity of 200 cow-acre-days.

[2] Complexes that include Urban land as a major part are not used for farming.

[3] Alluvial land is suited to grazing under improved management but is too highly variable in carrying capacity to be rated.

[4] Not used for farming.

Yield estimates were arrived at jointly by agronomists and soil scientists of the University of Maryland and Soil Conservation Service. Data for estimating yields were based on numerous sources of crop and soil research, U.S. Bureau of Census reports, market records, and miscellaneous publications issued by the Department of Agricultural Economics, University of Maryland, Agricultural Experiment Station.

Use of the Soils as Woodland [3]

According to the Conservation Needs Inventory, there were about 102,000 acres of forest land in Baltimore County in 1968. Urban and suburban expansion will result in a reduction of the acreage.

At the present time, forested lands have about one-third greater market value, per acre, for residential developments than farm land or idle land. Esthetic uses are also removing woodlands from woodcrop production.

The trees of Baltimore County consist of three general forest types. The Coastal Plain part of the county is dominated by red oak, willow oak, sweetgum, some loblolly pine, and an understory of holly.

In the northern part of the county, where soils mostly formed in residuum from mica schists (Chester, Glenelg, Elioak, Manor, and related series), forests are dominantly of oak and hickory. Between this part and the Coastal Plain, forests are dominantly of yellow-poplar and oak.

There are some unique forested areas in the county. Eastern hemlock is along some of the larger stream valleys, and northern sweet birch has invaded a few valleys. Thin soils over serpentine rock (Chrome series) support poor stands of blackjack oak, post oak, and Virginia pine.

Management of woodland

Table 3 lists all of the soils of the county that are suited to wood crops and lists those factors that affect woodland management. It shows the ordination (class and subclass) of each soil and the estimated site index for oaks and other suitable species. It identifies the species that should be favored in existing stands and those suitable for planting.

The hazards and limitations affecting woodland management are rated as slight, moderate, or severe. Equipment limitations vary according to slope and other characteristics that restrict or prohibit the use of heavy equipment commonly used in tending and harvesting trees. Seedling mortality refers to the loss of naturally seeded or planted tree seedlings as a result of unfavorable soil properties. Plant competition refers to invasion by, or growth of, such undesirable vegetation as weeds, shrubs, and vines when openings are made in the forest canopy. Plant competition adversely affects desirable tree species, particularly in the seedling and sapling stages.

Erosion hazard refers to the soil erosion that occurs following cutting operations and where the soil is exposed along roads, skid trails, fire lanes, and log decking areas. The degree of hazard varies with slope, but also with the erodibility of the particular kind of soil. Windthrow hazard is an evaluation of soil characteristics that control tree root development and, therefore, affect the tree's ability to withstand winds.

Woodland classes and subclasses

The soils of Baltimore County have been evaluated and grouped according to a nationwide system put into effect by woodland conservationists of the Soil Conservation Service. In this system, known as ordination, soils are placed in woodland classes according to their potential productivity for tree species and in subclasses according to their inherent limitations, if any, for woodland management.

Potential productivity is expressed as site index, which is the height, in feet, that a specified kind of tree growing on that soil is expected to reach in 50 years.

The woodland classification of the soils of Baltimore County is based mainly on the site index classes for commercial species of oaks, more specifically red oak, black oak, white oak, and pin oak. However, the classification is based in part on the site index classes for loblolly pine, Virginia pine, and yellow-poplar. While there are few if any natural stands of loblolly pine in Baltimore County, this species is abundant in nearby parts of Maryland, Delaware, and Virginia. Loblolly pine grows on the same kinds of soil, especially on the Coastal Plain. Loblolly pine is a good commercial tree for planting, and it grows well for reasonable distances outside its habitat. The determinations of site indices of all indexed species were made in Maryland and in parts of Pennsylvania, Delaware, New Jersey, and Virginia.

On the basis of their relative productivity for mixed oaks, the soils of Baltimore County have been placed in six classes: class 1, soils of very high productivity (site index greater than 85); class 2, soils of high productivity (site index 75 to 85); class 3, soils of medium productivity (site index 65 to 75); class 4, soils of low productivity (site index 55 to 65 ; class 5, soils of very low productivity (site index 45 to 55); and class 6, soils of such low productivity that they are of little or no economic value for trees (site index less than 45).

The soils of Baltimore County are divided into eight subclasses, identified as follows: subclass *x*, limitations due to extreme stoniness; subclass *w*, limitations due to wetness or a high water table; subclass *d*, limitations due to soil shallowness or restricted rooting depth; subclass *c*, limitations due to the kind or amount of clay at or within a few inches of the soil surface; subclass *s*, limitations due to excessive sandiness; subclass *f*, limitations due to large amounts of coarse fragments, smaller than stones, in the soil profile; subclass *r*, limitations due to relief or steep slope; and subclass *o*, no limitations.

The names of the soil series represented are mentioned in each woodland subclass description, but the listing of the series name does not necessarily indicate that all the soils of a series are in the same woodland subclass. The woodland subclass of individual soils is shown at the end of each mapping unit description and in the "Guide to Mapping Units."

In the following pages the woodland subclasses in Baltimore County are described.

[3] The introduction to this section was prepared by MR. OTTO KOELLING, assistant district forester, Maryland Department of Forests and Parks.

TABLE 3.—*Factors affecting*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in instructions for referring to other series that appear in the first column of this table. The land types Clay pits (Cp), Coastal beaches variable to rate and not suited to wood crops. Urban land mapped in complex with several soil series is also too variable to rate.

Soil series and map symbols	Woodland subclass	Management concerns			
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard
Aldino:					
AdA, AdB2	3o	Slight	Slight	Slight	Slight
AdC2, AsC	3r	Moderate	Slight	Slight	Slight
Alluvial land:					
Av	2w	Slight	Severe: high water table; flooding.	Moderate	Slight
Baile:					
BaA, BaB	1w	Slight	Severe: high water table.	Severe	Slight
Baltimore:					
BmA, BmB2, BmC2	1o	Slight	Slight	Slight	Slight
Barclay:					
Br	2w	Slight	Moderate: seasonal high water table.	Slight	Slight
Beltsville:					
BtA, BtB, BtC2	3w	Slight	Moderate: seasonally perched water table.	Moderate	Slight
Brandywine:					
BwB2, BwC2	3f	Slight	Slight	Moderate	Slight
ByD2, ByD3, ByE	3f	Slight	Moderate: slope	Moderate	Slight
Captina:					
CaA, CaB2	3w	Slight	Moderate: seasonally perched water table.	Slight	Slight
Chester:					
CcA, CcB2, CcC2, CgB2, CgC2	2o	Slight	Slight	Slight	Slight
*Chillum:					
ChB2, ChC2, ChC3, CkB2, CkC2, CkD2. For ratings of Neshaminy soils in units CkB2, CkC2, and CkD2 see Neshaminy series.	3o	Slight	Slight	Slight	Slight

woodland management

such mapping units may have different properties and different limitations, and for this reason it is necessary to follow carefully the (Ct), Made land (Ma), Mine dumps and quarries (Mr), Sand and gravel pits (Sg), Swamp (Sw), and Tidal marsh (Tm) generally are too Absence of an entry in a column means information was not available. Symbol > means greater than; symbol < means less than]

Management concerns—Con.		Site Index				Preferred species—		
Competition for—		Mixed oaks	Loblolly pine	Yellow-poplar	Virginia pine	In existing stands	For planting	For Christmas trees
Conifers	Hardwood							
Moderate Moderate	Slight Slight	65–75		70–80		Red oak, yellow-poplar, ash.	White pine, Virginia pine, Norway spruce.	Scotch pine, white pine, Norway spruce.
Severe	Moderate		85–95			Sweetgum, red maple, mixed oaks.	Loblolly pine, white pine, sweetgum.	Scotch pine, white pine.
Severe	Severe	85–95				Pin oak, other oaks, red maple.	White pine, Norway spruce, white spruce.	Scotch pine, white pine, Norway spruce.
Severe	Severe	85–95		>95		Red oak, black walnut, yellow-poplar, ash.	White pine, black walnut, yellow-poplar.	White pine, Scotch pine, Norway spruce.
Severe	Severe	75–85	85–95	85–95		Loblolly pine, sweetgum, red maple, red oak, yellow-poplar.	Loblolly pine	Scotch pine, white pine.
Moderate	Slight	60–75	65–75		65–75	Virginia pine, loblolly pine, red oak.	Virginia pine, loblolly pine, white pine.	Scotch pine, Austrian pine, white pine.
Moderate Moderate	Slight Slight	65–75		70–80	65–75	Red oak, shortleaf pine, yellow-poplar, Virginia pine.	Loblolly pine, white pine, larch.	Scotch pine, white pine, Norway spruce.
Moderate	Slight	65–75				Red oak, black oak, white oak, yellow-poplar, shortleaf pine, Virginia pine.	Virginia pine, white pine, shortleaf pine, larch, Norway spruce, white spruce.	Scotch pine, white pine, Norway spruce.
Severe	Moderate	75–85		77–89	75–85	Upland oaks, yellow-poplar, ash, black walnut, shortleaf pine, Virginia pine.	Black walnut, yellow-poplar, white pine, loblolly pine, larch.	Scotch pine, Norway spruce, Austrian pine, white pine, blue spruce.
Moderate	Slight	65–75		75–85	65–75	Red oak, Virginia pine, yellow-poplar.	White pine, loblolly pine, Virginia pine, yellow-poplar.	Scotch pine, Norway spruce, Austrian pine, white pine.

TABLE 3.—*Factors affecting*

Soil series and map symbols	Woodland subclass	Management concerns			
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard
Christiana: CmB, CmC2	3c	Slight	Moderate: plastic subsoil.	Slight	Slight
Chrome: CnB2	4c	Slight	Moderate: plastic subsoil.	Slight	Slight
CoC3, CoE3	6d	Severe	Moderate to severe: plastic subsoil, slope.	Severe	Moderate to severe.
Codorus: Cu	1w	Slight	Moderate: seasonal high water table; flooding.	Slight	Slight
Comus: Cv	1o	Slight	Slight	Slight	Slight
Conestoga: CwB2	1o	Slight	Slight	Slight	Slight
CwC2	1r	Moderate	Slight	Slight	Slight
Delanco: DcB	2o	Slight	Slight	Slight	Slight
Dunning: Du	1w	Slight	Severe: high water table; flooding.	Severe	Slight
Edgemont: EdB2, EdC2	3o	Slight	Slight	Slight	Slight
EgD, EgE (north aspects)	2r	Slight to moderate.	Moderate to severe: slopes.	Slight	Slight
(south aspects)	3r	Slight to moderate.	Moderate to severe: slopes.	Slight	Slight
Elioak: EhB2, EhC2, EkB2, EkC2	2c	Slight	Moderate: plastic subsoil.	Slight	Slight
ElC3	2c	Slight	Moderate: plastic subsoil.	Moderate	Slight
Elkton: Em, En	3w	Slight	Severe: high water table.	Slight	Slight

woodland management—Continued

Management concerns—Con.		Site Index				Preferred species—		
Competition for—		Mixed oaks	Loblolly pine	Yellow-poplar	Virginia pine	In existing stands	For planting	For Christmas trees
Conifers	Hardwood							
Moderate	Slight	65–75			65–75	Red oak, Virginia pine, sweetgum.	White pine, Virginia pine, loblolly pine.	Scotch pine, Norway spruce, Austrian pine, white pine.
Slight	Slight	55–65			55–65	Red oak, Virginia pine.	Virginia pine, white pine.	Scotch pine, white pine.
Slight	Slight					Virginia pine	None	None.
Severe	Severe	>85		>95		Red oak, red maple, yellow-poplar, ash.	White pine, yellow-poplar.	Douglas-fir, Scotch pine, Norway spruce, white pine, Austrian pine.
Severe	Severe	>85		>95		Red oak, black walnut, yellow-poplar, ash.	White pine, black walnut, yellow-poplar.	Douglas-fir, Scotch pine, Norway spruce, Austrian pine, white pine.
Severe	Severe	>85		>95		Red oak, black walnut, yellow-poplar, ash.	Yellow-poplar, white pine, black walnut.	Scotch pine, Norway spruce, Austrian pine, white pine.
Severe	Severe							
Severe	Severe							
Severe	Moderate	75–85		85–95		Red oak, yellow-poplar, red maple.	White pine, yellow-poplar.	Scotch pine, white pine.
Severe	Severe	>85				Pin oak, other oaks, red maple.	White pine, white spruce.	Scotch pine, white pine, Norway spruce.
Moderate	Slight	65–75		75–85		Yellow-poplar, Virginia pine, red oak.	White pine, Virginia pine, Norway spruce, yellow-poplar, larch.	Scotch pine, white pine, Norway spruce.
Moderate	Slight	75–85		85–95				
Moderate	Slight	65–75		75–85				
Severe	Moderate	75–85		85–95	70–80	Upland oaks, black walnut, yellow-poplar, shortleaf pine, Virginia pine.	Black walnut, yellow-poplar, white pine, loblolly pine.	Scotch pine, Norway spruce, Austrian pine.
Severe	Moderate							
Severe	Severe	75–85	75–85			Lowland oaks, loblolly pine, sweetgum, red maple.	Loblolly pine, white pine, sweetgum.	Scotch pine, white pine.

TABLE 3.—*Factors affecting*

Soil series and map symbols	Woodland subclass	Management concerns			
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard
Elsinboro: EsB, EsC2	2o	Slight	Slight	Slight	Slight
Fallsington: Fa, Fs	2w	Slight	Severe: high water table.	Severe	Slight
Fort Mott: FtB	3o	Slight	Slight	Slight	Slight
Galestown: GaB, GaC	3s	Slight	Moderate: loose sand.	Moderate	Slight
Glenelg: GcB2, GcC2, GcC3, GgB2, GgC2 GcD2, GcD3, GgD2, GgD3	2o 2r	Slight Moderate	Slight Moderate: slope	Slight Slight	Slight Slight
Glenville: GnA, GnB	2w	Slight	Moderate: seasonally perched water table.	Slight	Slight
Hagerstown: HaA, HaB2, HaC2	1c	Slight	Moderate: plastic subsoil.	Slight	Slight
Hatboro: Hb	2w	Slight	Severe: high water table; flooding.	Slight	Slight
*Hollinger: HoB2 HoC2	2o 2r	Slight Moderate	Slight Slight	Slight Slight	Slight Slight
HrD3 HsC For ratings of Conestoga soils in units HrD3 and HsC see Conestoga series.	2r 2r	Severe Moderate	Moderate: slope Slight	Slight Slight	Slight Slight
Iuka: Iu	1o	Slight	Slight	Slight	Slight

woodland management—Continued

Management concerns—Con.		Site Index				Preferred species—		
Competition for—		Mixed oaks	Loblolly pine	Yellow-poplar	Virginia pine	In existing stands	For planting	For Christmas trees
Conifers	Hardwood							
Severe	Moderate	75–85		85–95	75–85	Red oak, yellow-poplar, Virginia pine, ash.	White pine, yellow-poplar, loblolly pine.	Scotch pine, white pine, Austrian pine, Norway spruce, blue spruce.
Severe	Severe	75–85	75–90			Red oak, red maple, sycamore, sweetgum, loblolly pine, yellow-poplar.	Loblolly pine, white pine, sweetgum, yellow-poplar.	Scotch pine, white pine, Norway spruce.
Moderate	Slight	65–75	75–85		65–75	Red oak, Virginia pine, loblolly pine.	Loblolly pine, Virginia pine.	Scotch pine, white pine.
Moderate	Slight	65–75	75–85		65–75	Red oak, Virignia pine, shortleaf pine, loblolly pine.	Loblolly pine, shortleaf pine, Virginia pine.	Scotch pine, white pine.
Severe Severe	Moderate Moderate	75–85		85–95	60–80	Red oak, black walnut, yellow-poplar, shortleaf pine, Virginia pine.	White pine, black walnut, yellow-poplar, Virginia pine, larch, loblolly pine.	Scotch pine, white pine, Austrian pine, Norway spruce, blue spruce.
Severe	Moderate	75–85		85–95	70–80	Red oak, red maple, yellow-poplar, ash, sweetgum, Virginia pine.	White pine, loblolly pine, yellow-poplar.	Scotch pine, white pine, Austrian pine, Norway spruce.
Severe	Severe	>85		>95		Red oak, black walnut, yellow-poplar, ash.	White pine, black walnut, yellow-poplar.	Scotch pine, white pine, Norway spruce.
Moderate	Slight	65–75				Pin oak, other oaks, sycamore, sweetgum.	Sweetgum, sycamore, white pine.	Scotch pine, white pine, Norway spruce.
Severe Severe	Moderate Moderate	70–80		75–85	70–80	Red oak, black walnut, yellow-poplar, Virginia pine.	White pine, Virginia pine.	Scotch pine, Austrian pine, white pine, Norway spruce.
Severe Severe	Moderate Moderate	75–90		80–90	75–85	Red oak, black walnut, yellow-poplar, Virginia pine, ash.	White pine, Virginia pine, yellow-poplar.	Scotch pine, Austrian pine, white pine, Norway spruce.
Severe	Moderate		>95			Red oak, loblolly pine, yellow poplar.	Loblolly pine	Scotch pine, Austrian pine, white pine, Norway spruce.

TABLE 3.—*Factors affecting*

Soil series and map symbols	Woodland subclass	Management concerns			
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard
Joppa:					
JpB, JpC2, JpD2	3f	Slight	Slight	Moderate	Slight
Kelly:					
KeB2	4w	Slight	Severe: high water table; plastic subsoil.	Moderate	Moderate
KeC2, KsC	4w	Moderate	Severe: high water table; plastic subsoil.	Moderate	Moderate
Legore:					
LeB2, LeC2, LfC, LgC3	2o	Slight	Slight	Slight	Slight
LeD2, LeE, LfD, LfE, LgD3	2r	Slight to moderate.	Moderate to severe: slope.	Slight	Slight
Lenoir:					
LlB, LmB, LmC2, LnC3	3w	Slight	Moderate: seasonal water table; plastic subsoil.	Slight	Moderate
Leonardtown:					
Lr	3w	Slight	Severe: seasonally perched water table.	Severe	Moderate
Lindside:					
Ls	1w	Slight	Moderate: seasonal high water table.	Slight	Slight
Loamy and clayey land:					
LyB	3c	Slight	Moderate: plastic subsoil.	Slight	Slight
LyD	3c	Moderate	Moderate: plastic subsoil.	Slight	Slight
LyE	3c	Severe	Moderate: plastic subsoil; slope.	Slight	Slight
*Manor:					
MbB2, McB2	2o	Slight	Slight	Slight to moderate.	Slight
MbC2, MbC3, McC2, McC3	2r	Moderate	Slight	Slight to moderate.	Slight
MbD2, MbD3, McD2, McD3	2r	Severe	Moderate: slope	Slight to moderate.	Slight
MdE	2r	Severe	Moderate to severe: slope.	Slight to moderate.	Slight
MgC For ratings of Glenelg soils in McG see Glenelg series.	2r	Moderate	Slight	Slight	Slight
MhD For ratings of Brandywine soils in MhD see Brandywine series.	2r	Slight to severe.	Moderate: slope	Slight to moderate.	Slight
MhE For ratings of Brandywine soils in MhE see Brandywine series.	2r	Moderate to severe.	Severe: slope	Slight to moderate.	Slight

woodland management—Continued

Management concerns—Con.		Site Index				Preferred species—		
Competition for—		Mixed oaks	Loblolly pine	Yellow-poplar	Virginia pine	In existing stands	For planting	For Christmas trees
Conifers	Hardwood							
Moderate	Slight	65–75			65–75	Red oak, Virginia pine, shortleaf pine.	Loblolly pine, Virginia pine, shortleaf pine.	Scotch pine, white pine.
Severe	Moderate	55–65			55 65	Black oak, redcedar, shortleaf pine, Virginia pine.	Virginia pine	Scotch pine, white pine, Virginia pine.
Severe	Moderate							
Severe	Moderate	70–85		80–95	70–85	Red oak, black walnut, yellow-poplar, shortleaf pine, Virginia pine.	Yellow-poplar, Virginia pine, loblolly pine, white pine.	Scotch pine, Austrian pine, white pine, Norway spruce, blue spruce.
Severe	Moderate							
Moderate	Slight		70–80			Loblolly pine, red oak, sweetgum.	Loblolly pine	Scotch pine, Austrian pine, white pine.
Severe	Severe		75–85			Loblolly pine, red maple, sweetgum.	Loblolly pine	Scotch pine, Norway spruce.
Severe	Severe	>85		>95		Red oak, black walnut, yellow-poplar, ash.	White pine, yellow-poplar.	Scotch pine, Douglas-fir, Norway spruce, Austrian pine.
Moderate	Slight	65–75			65 75	Red oak, Virginia pine.	Virginia pine, loblolly pine.	Scotch pine, white pine.
Moderate	Slight							
Moderate	Slight							
Severe	Moderate	75–85		85–95	75–85	Red oak, yellow-poplar, shortleaf pine, Virginia pine.	Yellow-poplar, white pine, Virginia pine, loblolly pine.	Scotch pine, white pine, Norway spruce.
Severe	Moderate							
Severe	Moderate							
Severe	Moderate							
Severe	Moderate	75–85		85–95	75–85	Red oak, yellow-poplar, shortleaf pine, Virginia pine.	Yellow-poplar, white pine, Virginia pine, loblolly pine, larch.	Scotch pine, white pine, Norway spruce, blue spruce.
Moderate to severe.	Slight to moderate.	70–85		75–90	70–85	Red oak, yellow-poplar, shortleaf pine, Virginia pine.	Loblolly pine, white pine, Virginia pine, yellow-poplar, larch.	Scotch pine, white pine, Norway spruce.
Moderate to severe.	Slight to moderate.							

TABLE 3.—*Factors affecting*

Soil series and map symbols	Woodland subclass	Management concerns			
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard
Matapeake: MkA, MkB, MkC2	3o	Slight	Slight	Slight	Slight
Mattapex: MlA, MlB	3o	Slight	Slight	Slight	Slight
Melvin: Mn	1w	Slight	Severe: high water table; flooding.	Severe	Slight
Mo	1w	Slight	Severe: high water table.	Severe	Slight
Montalto: MsB2, MsC2	2c	Slight	Moderate: plastic subsoil.	Slight	Slight
Mt. Airy: MtB2, MtC2	3f	Slight	Slight	Moderate	Slight
MtD2, MtD3	3f	Slight	Moderate: slope	Moderate	Slight
Neshaminy: NeB2, NeC2	2o	Slight	Slight	Slight	Slight
Othello: Ot	3w	Slight	Severe: high water table.	Severe	Slight
Pocomoke: Po	2w	Slight	Severe: high water table.	Severe	Slight
Relay: ReC2	2o	Slight	Slight	Slight	Slight
ReD2, RsD, RyD3	2r	Moderate	Moderate: slope	Slight	Slight
RsE	2r	Moderate to severe.	Moderate to severe: slope.	Slight	Slight
*Sassafras: ShA, ShB, ShC2, ShC3, ShD2, SlA, SlB, SlC2	3o	Slight	Slight	Slight	Slight
SsD3	3o	Slight	Slight	Slight to moderate.	Slight
For ratings of Joppa soils in unit SsD3 see Joppa series.					
SsE	3r	Slight	Moderate: slope	Slight to moderate.	Slight
For ratings of Joppa soils in unit SsE see Joppa series.					

woodland management—Continued

Management concerns—Con.		Site Index				Preferred species—		
Competition for—		Mixed oaks	Loblolly pine	Yellow-poplar	Virginia pine	In existing stands	For planting	For Christmas trees
Conifers	Hardwood							
Moderate	Slight	70–80	75–85	85–95	70–80	Red oak, yellow-poplar, sweetgum, loblolly pine, Virginia pine.	Loblolly pine, white pine, yellow-poplar, sweetgum.	Scotch pine, white pine, Austrian pine.
Moderate to severe.	Slight to moderate.	70–80	75–85	75–85	----------	Red oak, yellow-poplar, sweetgum, loblolly pine.	Loblolly pine, white pine, sweetgum, yellow-poplar.	Scotch pine, white pine.
Severe	Severe	>85	---------	---------	----------	Pin oak, sweetgum.	White pine	Scotch pine, white pine.
Severe	Severe							
Severe	Severe	70–80	---------	85–95	70–80	Red oak, yellow-poplar, shortleaf pine, Virginia pine, black walnut, white pine, ash.	White pine, yellow-poplar, black walnut, loblolly pine.	Scotch pine, Austrian pine, white pine, Norway spruce.
Moderate	Slight	65–75	---------	70–80	65–75	Red oak, Virginia pine, yellow-poplar.	White pine, Virginia pine.	Scotch pine, white pine, Norway spruce.
Moderate	Slight							
Severe	Severe	75–85	---------	85–95	----------	Red oak, black walnut, yellow-poplar, ash.	Yellow-poplar, black walnut, white pine.	Scotch pine, white pine, Austrian pine, Norway spruce.
Severe	Severe	70–80	75–85	---------	----------	Red oak, red maple, loblolly pine, sweetgum.	Loblolly pine, sweetgum.	Scotch pine, white pine.
Severe	Severe	80–90	85–95	---------	----------	Pin oak, other oaks, loblolly pine, sweetgum.	Loblolly pine, sweetgum.	Scotch pine, white pine, Norway spruce.
Severe	Moderate	75–85	---------	85–95	75–85	Red oak, black walnut, yellow-poplar, Virginia pine.	White pine, black walnut, yellow-poplar.	Scotch pine, white pine, Austrian pine, Norway spruce, blue spruce.
Severe	Moderate							
Severe	Moderate							
Moderate	Slight	70–80	70–82	80–90	70–80	Red oak, loblolly pine, Virginia pine, yellow-poplar, sweetgum.	Loblolly pine, Virginia pine, white pine, yellow-poplar, sweetgum.	Scotch pine, white pine, Austrian pine.
Moderate	Slight	65–80	70–82	80–90	65–80	Red oak, Virginia pine, loblolly pine, yellow-poplar.	Loblolly pine, Virginia pine, shortleaf pine.	Scotch pine, white pine.
Moderate	Slight							

TABLE 3.—*Factors affecting*

Soil series and map symbols	Woodland subclass	Management concerns			
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard
Stony land, steep: St	5x	Slight	Severe: extreme stoniness; slope.	Moderate to severe.	Slight
Sunnyside: SuB2	2o	Slight	Slight	Slight	Slight
Watchung: WaA, WaB, WcB	1w	Slight	Severe: high water table; plastic subsoil.	Severe	Slight
Woodstown: WdA, WdB, WoA, WoB	2o	Slight	Slight	Slight	Slight

WOODLAND SUBCLASS 1o

This subclass consists of well-drained or moderately well drained soils of the Baltimore, Comus, Conestoga, and Iuka series. Slopes are not more than 15 percent. These soils are highly productive and have no significant restrictions or limitations for woodland use or management.

In a normal stand 50 years of age, the average annual growth per acre for trees on soils in this subclass is as follows: mixed oaks, 370 board feet of timber; yellow-poplar, 640 board feet of timber; loblolly pine, 900 board feet of timber or 1.5 cords of pulpwood; and Virginia pine, 3.0 cords of pulpwood.

At 30 years of age, a fully stocked stand of Virginia pine on these soils yields about 90 cords per acre of pulpwood, and at 50 years of age, about 150 cords per acre.

In a normal stand 50 years of age on these soils, the yield per acre is about as follows: mixed oaks, 18,500 board feet of timber; yellow-poplar, 32,000 board feet of timber; and loblolly pine, 27,000 board feet of timber or 77 cords of pulpwood.

The Baltimore, Comus, and Conestoga soils of this subclass are excellent for the production of black walnut, but no reliable estimates of yield are available.

WOODLAND SUBCLASS 1r

Conestoga loam, 8 to 15 percent slopes, moderately eroded is the oily soil in this subclass. It is well drained and highly productive, but it is moderately limited for use as woodland because of the risk of erosion.

In a normal stand 50 years of age, the average annual growth per acre for trees on soils in this subclass is as follows: mixed oaks, 370 board feet of timber; yellow-poplar, 640 board feet of timber; loblolly pine, 900 board feet of timber or 1.5 cords of pulpwood; and Virginia pine, 3.0 cords of pulpwood.

At 30 years of age, a fully stocked stand of Virginia pine on these soils yields about 90 cords per acre of pulpwood, and at 50 years of age, about 150 cords per acre.

In a normal stand 50 years of age on these soils, the yield per acre is about as follows: mixed oaks, 18,500 board feet of timber; yellow-poplar, 32,000 board feet of timber; and loblolly pine, 27,000 board feet of timber or 77 cords of pulpwood.

The soils of this subclass are excellent for the production of black walnut, but no reliable estimates of yield are available.

WOODLAND SUBCLASS 1w

This subclass consists of moderately well drained to very poorly drained soils of the Baile, Codorus, Dunning, Lindside, Melvin, and Watchung series. The soils are highly productive but have moderate to severe limitations to the use of heavy equipment because of seasonal wetness or a high water table.

All of these soils are well suited to oaks, and the Baile, Dunning, Melvin, and Watchung soils are especially well suited to pin oak. In a normal stand 50 years of age, the average annual growth per acre for oaks on soils in this subclass is about 370 board feet of timber, and the average yield per acre is about 18,500 board feet of timber.

Codorus and Lindside soils are especially well suited to yellow-poplar. In a normal stand 50 years of age, the average annual growth per acre is about 640 board feet of timber, and the average yield per acre is about 32,000 board feet of timber.

Many of these soils have good natural stands of red maple. Lindside soils generally are excellent for the production of black walnut. No reliable estimates of yield are available for either red maple or black walnut.

Seedling mortality is severe on some of these soils because of wetness, which is also responsible for severe plant competition for woodland species. There is a haz-

woodland management—Continued

Management concerns—Con.		Site Index				Preferred species		
Competition for—		Mixed oaks	Loblolly pine	Yellow-poplar	Virginia pine	In existing stands	For planting	For Christmas trees
Conifers	Hardwood							
Slight	Slight	45–55		55–65	45–55	Red oak, Virginia pine, yellow-poplar.	Virginia pine	None.
Severe	Moderate	75–85		85–95	75–85	Red oak, Virginia pine, yellow-poplar.	Loblolly pine, white pine, yellow-poplar.	Scotch pine, white pine, Austrian pine.
Severe	Severe	>85				Pin oak, red maple, sycamore.	White pine	Scotch pine, white pine, Norway spruce.
Severe	Moderate	75–85	80–90	85–95		Red oak, loblolly pine, yellow-poplar, sweetgum, red maple.	Loblolly pine, white pine, yellow-poplar, sweetgum.	Scotch pine, white pine, Norway spruce.

ard of flooding on Codorus, Dunning, Lindside, and some of the Melvin soils.

WOODLAND SUBCLASS 1c

This subclass consists of well-drained soils of the Hagerstown series. These soils are very highly productive, but have moderate limitations to the use of heavy equipment because of the plastic nature of the clay subsoil. These soils have slopes of not more than 15 percent. Plant competition for trees is severe.

In a normal stand 50 years of age, the average annual growth per acre for trees on soils in this subclass is as follows: mixed oaks, 370 board feet of timber, and yellow-poplar, 640 board feet of timber.

In a normal stand 50 years of age on these soils, the yield per acre is about 18,500 board feet of timber for oaks and about 32,000 board feet of timber for yellow-poplar.

Planted pines should grow well on these soils, but there are no natural stands. The soils are also excellent for production of black walnut, but no reliable estimates of yield are available.

WOODLAND SUBCLASS 2o

This subclass consists of well drained or moderately well drained soils of the Chester, Delanco, Elsinboro, Glenelg, Hollinger, Legore, Manor, Neshaminy, Relay, Sunnyside, and Woodstown series. The soils are highly productive and have no major limitations to woodland management. These soils have slopes of not more than 15 percent.

In a normal stand 50 years of age, the average annual growth per acre for trees on soils in this subclass is as follows: mixed oaks, 275 board feet of timber; yellow-poplar, 490 board feet of timber; loblolly pine, 680 board feet of timber or 1.3 cords of pulpwood; and Virginia pine, 1.9 cords of pulpwood.

At 30 years of age, a fully stocked stand of Virginia pine on these soils yields about 57 cords of pulpwood per acre, and at 50 years of age, about 95 cords per acre.

In a normal stand 50 years of age on these soils, the yield per acre is about as follows: mixed oaks, 13,750 board feet of timber; yellow-poplar, 24,400 board feet of timber; and loblolly pine, 18,800 board feet of timber or 63 cords of pulpwood.

The Chester, Glenelg, Hollinger, Legore, Neshaminy, and Relay soils of this subclass are good for the production of black walnut, but no reliable estimates of yield are available. There are a number of Christmas tree plantations on soils of this group in Baltimore County (fig. 11).

WOODLAND SUBCLASS 2r

This subclass consists of well-drained soils of the Brandywine, Edgemont, Glenelg, Hollinger, Legore, Manor (fig. 12), and Relay series. Some Conestoga soils are in larger areas of Hollinger soils. These soils, except for a few highly erodible soils, have slopes of more than 15 percent. They are highly productive, but limitations to woodland use and management are moderate to severe because of slope and erosion hazard.

In a normal stand 50 years of age, the average annual growth per acre for trees on soils in this subclass is as follows: mixed oaks, 275 board feet of timber; yellow-poplar, 490 board feet of timber; loblolly pine, 680 board feet of timber or 1.3 cords of pulpwood; and Virginia pine, 1.9 cords of pulpwood.

At 30 years of age, a fully stocked stand of Virginia pine on these soils yields about 57 cords of pulpwood per acre, and at 50 years of age, about 95 cords per acre.

In a normal stand 50 years of age on these soils, the

Figure 11.—Scotch pine on Glenelg and Manor soils being grown for use as Christmas trees. (Woodland group 2o).

yield per acre is about as follows: mixed oaks, 13,750 board feet of timber; yellow-poplar, 24,400 board feet of timber; and loblolly pine, 18,800 board feet of timber or 63 cords of pulpwood.

The Glenelg, Hollinger, Legore, and Relay soils of this subclass are good for the production of black walnut, but no reliable estimates of yield are available.

WOODLAND SUBCLASS 2w

This subclass consists of very poorly drained to moderately well drained soils of the Barclay, Fallsington, Glenville, Hatboro, and Pocomoke series, and Alluvial land. The soils are highly productive but have moderate to severe limitations on the use of heavy equipment because of seasonal wetness or a high water table.

Most of these soils are well suited to oaks and to loblolly pine. In a normal stand 50 years of age, the average annual growth per acre for oak trees on soils in this subclass is 275 board feet of timber, and the average yield per acre is about 13,750 board feet of timber. For loblolly pine, the average annual growth per acre is about 680 board feet of timber or 1.3 cords of pulpwood, and the average yield per acre is about 18,800 board feet of timber or 63 cords of pulpwood.

Barclay, Fallsington, and Glenville soils are well suited to yellow-poplar. In a normal stand 50 years of age on these soils, the average annual growth per acre is about 490 board feet of timber, and the average yield per acre is about 24,400 board feet of timber.

Some areas of these soils have good natural stands of sweetgum or of red maple, but no reliable estimates of yield are available.

Seedling mortality and plant competition for trees are severe on some of these soils. There is a hazard of flooding on Alluvial land and on Hatboro soils.

WOODLAND SUBCLASS 2c

This subclass consists of well-drained soils of the Elioak and Montalto series. These soils are highly productive but have moderate limitations on the use of heavy equipment because of the plastic nature of the clayey subsoil. These soils have slopes of not more than 15 percent.

In a normal stand 50 years of age, the average annual growth per acre for trees on soils in this subclass is as follows: mixed oaks, 275 board feet of timber; yellow-poplar, 490 board feet of timber; loblolly pine, 680 board feet of timber or 1.3 cords of pulpwood; and Virginia pine, 1.9 cords of pulpwood.

At 30 years of age, a fully stocked stand of Virginia pine on these soils yields about 57 cords of pulpwood per acre, and at 50 years of age, about 95 cords per acre.

In a normal stand 50 years of age on these soils, the yield per acre is about as follows: mixed oaks, 13,750 board feet of timber; yellow-poplar, 24,400 board feet of

Figure 12.—Mature stand of yellow-poplar on Manor loam, 15 to 25 percent slopes, moderately eroded. (Woodland group 2r).

timber; and loblolly pine, 18,800 board feet of timber or 63 cords of pulpwood.

The soils of this subclass are also good for the production of black walnut, but no reliable estimates of yield are available.

Plant competition is moderate to severe for trees.

WOODLAND SUBCLASS 3o

This subclass consists of well drained or moderately well drained soils of the Aldino, Chillum, Edgemont, Fort Mott, Matapeake, Mattapex, and Sassafras series. Some areas of Joppa soils occur with Sassafras soils. These soils are moderately productive and have no major limitations for woodland management. Slopes are not more than 15 percent.

In a normal stand 50 years of age, the average annual growth per acre for trees on soils in this subclass is as follows: mixed oaks, 200 board feet of timber; yellow-poplar, 350 board feet of timber; loblolly pine, 470 board feet of timber or 1 cord of pulpwood; and Virginia pine, 1.1 cords of pulpwood.

At 30 years of age, a fully stocked stand of Virginia pine on these soils yields about 33 cords of pulpwood per acre, and at 50 years of age, about 54 cords per acre.

In a normal stand 50 years of age on these soils, the yield per acre is about as follows: mixed oaks, 9,750 board feet of timber; yellow-poplar, 17,600 board feet of timber; and loblolly pine, 11,400 board feet of timber or 51 cords of pulpwood.

A few areas of these soils have fairly good natural stands of sweetgum, but no reliable estimates of yield are available.

WOODLAND SUBCLASS 3r

This subclass consists of moderately well drained or well drained soils of the Aldino, Edgemont, and Sassafras series. Some areas of Joppa soils occur with Sassafras

soils. These soils are moderately productive but limitations to woodland use and management are moderate to severe because of slopes that limit the use of heavy equipment, or a moderate erosion hazard, or both. These soils, except for the highly erodible Aldino soils, have slopes of more than 15 percent.

In a normal stand 50 years of age, the average annual growth per acre for trees on soils in this subclass is as follows: mixed oaks, 200 board feet of timber; yellow-poplar, 350 board feet of timber; loblolly pine, 470 board feet of timber or 1 cord of pulpwood; and Virginia pine, 1.1 cords of pulpwood.

At 30 years of age, a fully stocked stand of Virginia pine on these soils yields about 33 cords of pulpwood per acre, and at 50 years of age, about 54 cords.

In a normal stand 50 years of age on these soils, the yield per acre is about as follows: mixed oaks, 9,750 board feet of timber; yellow-poplar, 17,600 board feet of timber; and loblolly pine, 11,400 board feet of timber or 51 cords of pulpwood.

A few areas of these soils have a fairly good natural stand of sweetgum but no reliable estimates of yield are available.

WOODLAND SUBCLASS 3w

This subclass consists of moderately well drained to poorly drained soils of the Beltsville, Captina, Elkton, Lenoir, Leonardtown, and Othello series. These soils are moderately productive but have moderate to severe limitations to the use of heavy equipment because of seasonal wetness or a high water table.

In a normal stand 50 years of age, the average annual growth per acre for trees on soils in this subclass is as follows: mixed oaks, 200 board feet of timber; and loblolly pine, 470 board feet of timber or 1 cord of pulpwood.

On Beltsville and Captina soils of this subclass, a fully stocked stand of Virginia pine at 30 years of age yields about 33 cords of pulpwood per acre, and at 50 years of age, it yields about 54 cords per acre.

In a normal stand 50 years of age on these soils, the yield per acre is about as follows: mixed oaks, 9,750 board feet of timber; and loblolly pine, 11,400 board feet of timber or 51 cords of pulpwood.

Yellow-poplar is not well suited to most of these soils. Some areas have fairly good stands of sweetgum or of red maple, but no reliable estimates of yield are available.

Seedling mortality and plant competition for tree species are severe on some of these soils.

WOODLAND SUBCLASS 3c

This subclass consists of well-drained soils of the Christiana series, and well-drained Loamy and clayey land. These soils and land types are moderately productive but have moderate limitations to the use of heavy equipment because of the plastic nature of the clay subsoil. These soils have slopes generally less than 15 percent, but a few areas have slopes of 40 percent.

In a normal stand 50 years of age, the average annual growth per acre for trees on soils in this subclass is as follows: mixed oaks, 200 board feet of timber; and Virginia pine, 1.1 cords of pulpwood. Most other trees are not well adapted to soils of this subclass.

At 30 years of age, a fully stocked stand of Virginia pine on these soils yields about 33 cords of pulpwood per acre, and at 50 years of age, about 54 cords per acre.

In a normal stand 50 years of age on these soils, the yield per acre of mixed upland oaks is about 9,750 board feet of timber.

WOODLAND SUBCLASS 3s

This subclass consists of somewhat excessively drained soils of the Galestown series. These soils are moderately productive and have moderate limitations to the use of heavy equipment and moderate seedling mortality because of a very sandy surface layer and seasonal droughtiness. These soils have slopes of not more than 10 percent.

In a normal stand 50 years of age, the average annual growth per acre for trees on soils in this subclass is as follows: mixed oaks, 200 board feet of timber; loblolly pine, 470 board feet of timber or 1 cord of pulpwood; and Virginia pine, 1.1 cords of pulpwood.

At 30 years of age, a fully stocked stand of Virginia pine on these soils yields about 33 cords of pulpwood per acre, and at 50 years of age, about 54 cords per acre.

In a normal stand 50 years of age on these soils, the yield per acre is about as follows: mixed oaks, 9,750 board feet of timber; and loblolly pine, about 11,400 board feet of timber or 51 cords of pulpwood. The soils of this subclass generally are not well suited to the production of other timber trees.

WOODLAND SUBCLASS 3f

This subclass consists of well-drained to somewhat excessively drained soils of the Brandywine, Joppa, and Mt. Airy series. These soils are moderately productive but have moderate seedling mortality because of seasonal droughtiness resulting from large amounts of coarse fragments in the soil profile. These fragments range from 2 millimeters to several inches in size. Slopes generally are as much as about 25 percent, but are steeper in places. There is a moderate limitation on the use of heavy equipment in many areas of the steeper soils.

In a normal stand 50 years of age, the average annual growth per acre for trees on soils in this subclass is as follows: mixed oaks, 200 board feet of timber; yellow-poplar, 350 board feet of timber; and Virginia pine, 1.1 cords of pulpwood.

At 30 years of age, a fully stocked stand of Virginia pine on these soils yields about 33 cords of pulpwood per acre, and at 50 years of age, about 54 cords per acre.

In a normal stand 50 years of age on these soils, the yield per acre is about as follows: mixed oaks, 9,750 board feet of timber; and yellow-poplar, 17,600 board feet of timber. The soils of this subclass generally are not well suited to the production of other timber trees.

WOODLAND SUBCLASS 4w

This subclass consists of somewhat poorly drained soils of the Kelly series. These soils are low in productivity and have severe limitations to the use of heavy equipment because of seasonal wetness or a high water table and the very plastic clay subsoil. They have slopes of not more than 15 percent.

The most common economic timber species on these soils are black oak and Virginia pine. In a normal stand 50 years of age, the average annual growth per acre for

trees on soils in this subclass is 125 board feet of timber for oaks, and 0.6 cord of pulpwood for Virginia pine.

At 30 years of age, a fully stocked stand of Virginia pine on these soils yields about 19 cords of pulpwood per acre, and at 50 years of age, about 31 cords per acre.

In a normal stand 50 years of age on these soils, the yield for oaks is about 6,300 board feet of timber.

The soils of this subclass generally are not well suited to the production of other timber trees. Some redcedar and shortleaf pine grow in places.

WOODLAND SUBCLASS 4c

Chrome silt loam, 3 to 8 percent slopes, moderately eroded, is the only soil in this subclass. It is well-drained and low in productivity. This soil has moderate limitations to the use of heavy equipment because of the very plastic nature of the highly clayey subsoil. These soils have no other major limitations.

The most common economic timber species on these soils are red oak and Virginia pine. In a normal stand 50 years of age, the average annual growth per acre for trees on soils in this subclass is 125 board feet of timber for oaks, and 0.6 cord of pulpwood for Virginia pine.

At 30 years of age, a fully stocked stand of Virginia pine on these soils yields about 19 cords of pulpwood per acre, and at 50 years of age, about 31 cords per acre.

In a normal stand 50 years of age on these soils, the yield for oaks is about 6,300 board feet of timber.

The soils of this subclass generally are poorly suited to the production of other timber trees.

WOODLAND SUBCLASS 5x

This subclass consists of Stony land, steep (fig. 13). It is very low in productivity, and has severe limitations to the use of heavy equipment because of extreme stoniness and steep slopes. Some areas have stands of red oak,

Figure 13.—**Wooded area of Stony land, steep (Woodland group 5x).**

yellow-poplar, or Virginia pine. Woodcrop production generally is not feasible. Virginia pine is best for planting where additional cover is desired for watershed protection and wildlife habitat.

WOODLAND SUBCLASS 6d

This subclass consists of well-drained, severely eroded soils of the Chrome series. These soils are very low in productivity, mainly because of very shallow depth to bedrock. Slopes range from 3 to 45 percent. There are few trees except for some scattered clumps of Virginia pine and scrub-type oaks. Growth is very slow, and yields are too low for feasible or economic tree production.

Use of the Soils for Wildlife

The welfare of a wildlife species largely depends on the amount and distribution of food, shelter, and water. If any of these elements is missing, inadequate, or inaccessible, wildlife is absent or scarce. The kinds and numbers of wildlife that live in a given area are closely related to land use, to the resulting species and patterns of vegetation, and to the supply and distribution of water. These factors, in turn, generally are related to the kinds of soil.

Habitat for wildlife normally can be developed or improved by planting suitable vegetation, by properly managing the existing plant cover, by fostering the natural establishment of desirable plants, or by using a combination of these measures.

Uses of suitability ratings

The suitability ratings can be used as an aid in—

1. Planning the broad use of parks, game refuges, nature-study areas, and other recreational developments for wildlife.
2. Selecting the better soils for developing, improving, or maintaining specific kinds of wildlife habitat elements.
3. Determining the relative intensity of management needed for individual habitat elements.
4. Eliminating sites that would be difficult or not feasible to manage for specific kinds of wildlife.
5. Determining areas that are suitable for acquisition for use as wildlife habitat.

Table 4 lists the soils in the county and rates their suitability for eight elements of wildlife habitat and for three classes, or groups, of wildlife. The ratings used are *good*, *fair*, *poor*, and *not suited*.

For soils rated *good*, wildlife habitat generally is easily developed, improved, or maintained. Limitations are few, if any, and satisfactory results are assured.

For soils rated *fair*, wildlife habitat generally can be developed, improved, or maintained. These soils have moderate limitations. Good management and frequent attention are required for satisfactory results.

For soils rated *poor*, wildlife habitat generally can be developed, improved, or maintained, though limitations are severe. Habitat management is difficult and expensive and requires intensive effort. Satisfactory results are questionable.

For soils rated *not suited*, habitat is impractical to develop, improve, or maintain. Limitations are severe. Unsatisfactory results are probable.

Not considered in the ratings are present land use, the location of a soil in relation to other soils, and the mobility of wildlife.

Each soil is rated in table 4 according to its suitability for various kinds of plants and other elements that make up wildlife habitat. The elements of wildlife habitat are discussed in the following paragraphs.

Grain and seed crops include such seed-producing annuals as corn, sorghum, wheat, barley, oats, millet, buckwheat, cowpeas, and other plants commonly grown for grain or for seed. The major soil properties affecting this wildlife habitat element are effective rooting depth, available water capacity, natural drainage, slope, surface stoniness, hazard of flooding, and texture of the surface layer and subsoil.

Grasses and legumes are domestic grasses and legumes that are established by planting. They include bluegrass, fescue, brome, timothy, orchardgrass, reed canarygrass, clover, and alfalfa. The major soil properties affecting this habitat element are effective rooting depth, available water capacity, natural drainage, slope, surface stoniness, hazard of flooding, and texture of the surface layer and subsoil.

Wild herbaceous upland plants are perennial grasses and weeds that generally are established naturally. They include bluestem, quackgrass, panicgrass, goldenrod, wild carrot, nightshade, and dandelion. The major soil properties affecting this wildlife habitat element are effective rooting depth, available water capacity, natural drainage, surface stoniness, hazard of flooding or ponding, and texture of the surface layer and subsoil.

Hardwood woody plants are nonconiferous trees, shrubs, and woody vines that produce nuts or other fruits, buds, catkins, twigs, or foliage that wildlife eat. They generally are established naturally but can be planted. Among the native species are oak, cherry, maple, poplar, apple, hawthorn, dogwood, persimmon, sumac, sassafras, hazelnut, black walnut, hickory, sweetgum, bayberry, blueberry, huckleberry, blackhaw, viburnum, grape, and brier. The major soil properties affecting this wildlife habitat element are effective rooting depth, available water capacity, natural drainage, and surface stoniness or rockiness.

Also in this group are several varieties of fruiting shrubs that are raised commercially for planting. Autumn-olive, Amur honeysuckle, Tatarian honeysuckle, crabapple, multiflora rose, highbush cranberry, and silky cornel dogwood are some of the shrubs that generally are available. They can be planted on soils that are rated well suited. Hardwoods that are not available commercially generally can be transplanted successfully.

Coniferous woody plants consist of cone-bearing evergreen trees and shrubs that are used by wildlife primarily as cover, though they also provide browse and seeds. Among these are Norway spruce, Virginia pine, loblolly pine, shortleaf pine, pond pine, Scotch pine, redcedar, and Atlantic whitecedar. Generally, the plants are established naturally in areas where cover of weeds and sod is thin. The major soil properties affecting this wildlife habitat element are effective rooting depth, available water capacity, natural drainage, surface stoniness or rockiness,

and texture of the surface layer and subsoil. Soils that are well suited are those on which plants grow slowly and closing of the canopy is delayed. Branches maintained close to the ground provide food and cover for pheasant, rabbits, and other small animals. If the canopy shuts out the light, the lower branches die.

On soils that are poorly suited as coniferous wildlife habitat, widely spaced conifers can quickly but only temporarily produce the desired growth. Maintaining the plants is difficult because the soils are well suited to hardwood plants. Unless the stand is carefully managed, hardwoods invade and commonly overtop the conifers.

Wetland food and cover plants consist of wild, herbaceous, annual and perennial plants that grow on moist to wet sites. They include smartweed, wild millet, bulrush, sedges, barnyard grass, pondweed, duckweed, duckmillet, arrow-arum, pickerelweed, waterwillow, wetland grasses, wildrice, and cattails. The major soil properties affecting this wildlife habitat element are natural drainage, surface stoniness, frequency of flooding or ponding, slope, and texture of the surface layer and subsoil.

Shallow-water developments consist of impoundments or excavations that provide areas of shallow water near food and cover for wetland wildlife. Examples are shallow dugouts, level ditches, blasted potholes, and marshes where water is kept at a depth of 6 to 24 inches. The major soil properties affecting this wildlife habitat element are depth to bedrock, natural drainage, slope, hazard of flooding, and surface stoniness.

Excavated ponds are dugout areas that generally contain ground water rather than runoff. They provide water for many kinds of wildlife, particularly for migratory or overwintering waterfowl. The major soil properties affecting this wildlife habitat element are depth to bedrock, natural drainage, surface stoniness, slope, and hazard of flooding.

Farm ponds of the impounded type are not considered in this wildlife habitat element; however, they can be important for recreational activities including fishing and can in addition be a source of water for wildlife. If stocked with fish, such impoundments (fig. 14) should be at least 6 feet deep over a large part of the area.

Table 4 rates the soils according to their suitability for three classes of wildlife in the county—open-land, woodland, and wetland wildlife. These classes are discussed in the following paragraphs.

***Figure 14.*—Impounded farm pond stocked with bass and bluegill on Hatboro silt loam**

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TABLE 4.—*Suitability of the soils for elements*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils structions for referring to other series that appear in the first column of this table. Not included in this table, because they are too Urban land mapped in complex with several soil series is too variable to rate, and the complexes that include this land type are not

Soil series and map symbols	Elements of wildlife habitat				
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants
Aldino:					
AdA	Fair	Good	Good	Good	Poor
AdB2, AdC2	Fair	Good	Good	Good	Poor
AsC	Not suited	Poor	Good	Good	Poor
Alluvial land:					
Av	Not suited	Poor	Poor	Good	Good
Baile:					
BaA	Poor	Fair	Fair	Good	Fair
BaB	Poor	Fair	Fair	Good	Fair
Baltimore:					
BmA	Good	Good	Good	Good	Poor
BmB2, BmC2	Fair	Good	Good	Good	Poor
Barclay:					
Br	Fair	Fair	Good	Good	Poor
Beltsville:					
BtA	Fair	Good	Good	Good	Poor
BtB, BtC2	Fair	Good	Good	Good	Poor
Brandywine:					
BwB2, BwC2, ByD2	Poor	Fair	Fair	Fair	Fair
ByD3, ByE	Not suited	Poor	Fair	Fair	Fair
Captina:					
CaA	Fair	Good	Good	Good	Poor
CaB2	Fair	Good	Good	Good	Poor
Chester:					
CcA	Good	Good	Good	Good	Poor
CcB2, CcC2, CgB2, CgC2	Fair	Good	Good	Good	Poor
*Chillum:					
ChB2, ChC2, CkB2, CkC2	Fair	Good	Good	Good	Poor
ChC3, CkD2	Poor	Fair	Good	Good	Poor
For properties of Neshaminy soils in units CkB2, CkC2, and CkD2, see the Neshaminy series.					
Christiana:					
CmB, CmC2	Fair	Good	Good	Good	Poor
Chrome:					
CnB2	Poor	Poor	Fair	Fair	Fair
CoC3, CoE3	Not suited	Not suited	Poor	Poor	Poor
Coastal beaches:					
Ct	Not suited	Poor	Poor	Not suited	Not suited
Codorus:					
Cu	Fair	Good	Good	Good	Poor
Comus:					
Cv	Good	Good	Good	Good	Poor
Conestoga:					
CwB2, CwC2	Fair	Good	Good	Good	Poor
Delanco:					
DcB	Fair	Good	Good	Good	Poor
Dunning:					
Du	Not suited	Poor	Poor	Good	Good
Edgemont:					
EdB2, EdC2	Fair	Good	Good	Good	Poor
EgD, EgE	Not suited	Fair	Good	Good	Poor
Elioak:					
EhB2, EhC2, EkB2, EkC2	Fair	Good	Good	Good	Poor
ElC3	Poor	Fair	Good	Good	Poor
Elkton:					
Em, En	Poor	Fair	Fair	Good	Fair
Elsinboro:					
EsB, EsC2	Fair	Good	Good	Good	Poor
Fallsington:					
Fa, Fs	Poor	Fair	Fair	Good	Fair
Fort Mott:					
FtB	Fair	Fair	Fair	Fair	Good
Galestown:					
GaB, GaC	Poor	Poor	Poor	Poor	Good

of wildlife habitat and for kinds of wildlife

in such mapping units may have different properties and different limitations, and for this reason it is necessary to follow carefully the invariable to rate, are the land types Clay pits (Cp), Made land (Ma), Mine dumps and quarries (Mr), and Sand and gravel pits (Sg). listed. Areas of these complexes generally are not available for wildlife developments]

Elements of wildlife habitat—Continued			Kinds of wildlife		
Wetland food and cover plants	Shallow water developments	Excavated ponds	Open-land	Woodland	Wetland
Poor	Poor	Poor	Good	Good	Poor.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Good	Not suited	Not suited	Poor	Good	Poor.
Good	Good	Good	Fair	Good	Good.
Poor	Not suited	Not suited	Fair	Good	Not suited.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Fair	Fair	Fair	Good	Fair	Fair.
Poor	Poor	Poor	Good	Good	Poor.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Fair	Fair	Not suited.
Not suited	Not suited	Not suited	Poor	Fair	Not suited.
Poor	Poor	Poor	Good	Good	Poor.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Fair	Fair	Not suited.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Poor	Fair	Not suited.
Not suited	Not suited	Not suited	Poor	Poor	Not suited.
Not suited	Not suited	Not suited	Not suited	Not suited	Not suited.
Poor	Poor	Poor	Good	Good	Poor.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Good	Good	Good	Poor	Good	Good.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Fair	Good	Not suited.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Fair	Good	Not suited.
Good	Good	Good	Fair	Good	Good.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Good	Good	Good	Fair	Good	Good.
Not suited	Not suited	Not suited	Fair	Fair	Not suited.
Not suited	Not suited	Not suited	Poor	Poor	Not suited.

TABLE 4.—*Suitability of the soils for elements of*

Soil series and map symbols	Elments of wildlife habitat				
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants
Glenelg:					
GcB2, GcC2, GgB2, GgC2	Fair	Good	Good	Good	Poor
GcC3, GcD2, GgD2	Poor	Fair	Good	Good	Poor
GcD3, GgD3	Not suited	Poor	Good	Good	Poor
Glenville:					
GnA	Fair	Good	Good	Good	Poor
GnB	Fair	Good	Good	Good	Poor
Hagerstown:					
HaA	Good	Good	Good	Good	Poor
HaB2, HaC2	Fair	Good	Good	Good	Poor
Hatboro:					
Hb	Poor	Fair	Fair	Good	Fair
*Hollinger:					
HoB2, HoC2	Fair	Good	Good	Good	Poor
HrD3, HsC	Not suited	Poor	Good	Good	Poor
For properties of Conestoga soils in units HrD3 and HsC, see the Conestoga series.					
Iuka:					
Iu	Fair	Good	Good	Good	Poor
Joppa:					
JpB, JpC2	Fair	Fair	Fair	Fair	Poor
JpD2	Poor	Poor	Fair	Fair	Poor
Kelly:					
KeB2, KeC2	Fair	Fair	Fair	Fair	Fair
KsC	Not suited	Poor	Fair	Fair	Fair
Legore:					
LeB2, LeC2	Fair	Good	Good	Good	Poor
LeD2, LgC3	Poor	Fair	Good	Good	Poor
LeE, LfC, LfD, LgD3	Not suited	Poor	Good	Good	Fair
LfE	Not suited	Not suited	Good	Good	Fair
Lenoir:					
LB, LmB, LmC2	Fair	Fair	Good	Good	Poor
LnC3	Poor	Fair	Good	Good	Poor
Leonardtown:					
Lr	Poor	Fair	Fair	Fair	Fair
Lindside:					
Ls	Fair	Good	Good	Good	Poor
Loamy and clayey land:					
LyB	Poor	Fair	Fair	Fair	Poor
LyD, LyE	Not suited	Poor	Fair	Fair	Poor
*Manor:					
MbB2, MbC2, McB2, McC2	Fair	Fair	Fair	Fair	Fair
MbC3, MbD2, McC3, McD2	Poor	Fair	Fair	Fair	Fair
MbD3, McD3, MdE, MgC, MhD	Not suited	Poor	Fair	Fair	Fair
MhE	Not suited	Not suited	Fair	Fair	Fair
For properties of Glenelg soils in unit MgC and of Brandywine soils in units MhD and MhE, see Glenelg and Brandywine series, respectively.					
Matapeake:					
MkA	Good	Good	Good	Good	Poor
MkB, MkC2	Fair	Good	Good	Good	Poor
Mattapex:					
MlA	Fair	Good	Good	Good	Poor
MlB	Fair	Good	Good	Good	Poor
Melvin:					
Mn, Mo	Poor	Fair	Fair	Good	Fair
Montalto:					
MsB2, MsC2	Fair	Good	Good	Good	Poor
Mt. Airy:					
MtB2, MtC2	Fair	Fair	Fair	Fair	Good
MtD2	Poor	Fair	Fair	Fair	Good
MtD3	Not suited	Poor	Fair	Fair	Good
Neshaminy:					
NeB2, NeC2	Fair	Good	Good	Good	Poor
Othello:					
Ot	Poor	Fair	Fair	Good	Fair
Pocomoke:					
Po	Not suited	Poor	Poor	Good	Good

wildlife habitat and for kinds of wildlife—Continued

Elements of wildlife habitat—Continued			Kinds of wildlife		
Wetland food and cover plants	Shallow water developments	Excavated ponds	Open-land	Woodland	Wetland
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Fair	Good	Not suited.
Not suited	Not suited	Not suited	Poor	Good	Not suited.
Poor	Poor	Poor	Good	Good	Poor.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Fair	Poor	Poor	Fair	Good	Poor.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Poor	Good	Not suited.
Poor	Poor	Poor	Good	Good	Poor.
Not suited	Not suited	Not suited	Fair	Fair	Not suited.
Not suited	Not suited	Not suited	Poor	Fair	Not suited.
Poor	Not suited	Not suited	Fair	Fair	Not suited.
Poor	Not suited	Not suited	Poor	Fair	Not suited.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Fair	Good	Not suited.
Not suited	Not suited	Not suited	Poor	Good	Not suited.
Not suited	Not suited	Not suited	Poor	Good	Not suited.
Poor	Not suited	Not suited	Fair	Good	Not suited.
Poor	Not suited	Not suited	Fair	Fair	Not suited.
Fair	Fair	Fair	Fair	Fair	Fair.
Poor	Poor	Poor	Good	Good	Poor.
Not suited	Not suited	Not suited	Fair	Fair	Not suited.
Not suited	Not suited	Not suited	Poor	Fair	Not suited.
Not suited	Not suited	Not suited	Fair	Fair	Not suited.
Not suited	Not suited	Not suited	Fair	Fair	Not suited.
Not suited	Not suited	Not suited	Poor	Fair	Not suited.
Not suited	Not suited	Not suited	Poor	Fair	Not suited.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Poor	Poor	Poor	Good	Good	Poor.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Fair	Fair	Fair	Fair	Good	Fair.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Fair	Fair	Not suited.
Not suited	Not suited	Not suited	Fair	Fair	Not suited.
Not suited	Not suited	Not suited	Poor	Fair	Not suited.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Good	Good	Good	Fair	Good	Good.
Good	Good	Good	Poor	Good	Good.

TABLE 4.—*Suitability of the soils for elements of*

Soil series and map symbols	Elements of wildlife habitat				
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants
Relay:					
ReC2	Fair	Good	Good	Good	Poor
ReD2	Poor	Fair	Good	Good	Poor
RsD	Not suited	Poor	Good	Good	Fair
RsE	Not suited	Not suited	Good	Good	Fair
RyD3	Not suited	Poor	Good	Good	Fair
*Sassafras:					
ShA, SlA	Good	Good	Good	Good	Poor
ShB, ShC2, SlB, SlC2	Fair	Good	Good	Good	Poor
ShC3, ShD2	Poor	Fair	Good	Good	Poor
SsD3, SsE	Not suited	Poor	Fair	Fair	Poor
For properties of Joppa soils in units SsD3 and SsE, see the Joppa series.					
Stony land, steep:					
St	Not suited	Not suited	Poor	Poor	Fair
Sunnyside:					
SuB2	Fair	Good	Good	Good	Poor
Swamp:					
Sw	Not suited	Poor	Not suited	Good	Not suited
Tidal marsh:					
Tm	Not suited	Not suited	Not suited	Not suited	Not suited
Watchung:					
WaA	Poor	Fair	Fair	Good	Fair
WaB	Poor	Fair	Good	Good	Good
WcB	Not suited	Poor	Good	Good	Good
Woodstown:					
WdA, WoA	Fair	Good	Good	Good	Poor
WdB, WoB	Fair	Good	Good	Good	Poor

Open-land wildlife includes quail, pheasant, meadowlark, field sparrow, dove, cottontail rabbit, red fox, and woodchuck. These birds and mammals generally make their homes in areas of cropland, pasture, meadow, and lawns and in areas overgrown with grasses, herbs, and shrubs.

Woodland wildlife includes ruffed grouse, woodcock, thrush, vireo, scarlet tanager, gray and red squirrels, gray fox, white-tailed deer, raccoon, and wild turkey. They obtain food and cover in stands of hardwoods, coniferous trees, shrubs, or a mixture of these plants.

Wetland wildlife includes ducks, geese, rails, herons, shore birds, and muskrat that commonly live in ponds, marshes, and swamps.

Ratings indicated under kinds of wildlife in table 4 are based on the ratings shown for the wildlife habitat elements. For *open-land wildlife* the ratings are based on grain and seed crops, grasses and legumes, wild herbaceous upland plants, hardwood plants, and coniferous wildlife habitat. For *woodland wildlife* the ratings are based on grasses and legumes, wild herbaceous upland plants, hardwood woody plants, and coniferous woody plants. For *wetland wildlife* the ratings are based on wetland food and cover plants, shallow-water developments, and excavated ponds.

Engineering Uses of the Soils

This section is useful to those who need information about soils used as structural material or as foundation upon which structures are built. Among those who can benefit from this section are planning commissions, town and city managers, land developers, engineers, contractors, and farmers.

Among properties of soils highly important in engineering are permeability, strength, compaction characteristics, soil drainage condition, shrink-swell potential, grain size, plasticity, and soil reaction. Also important are slope and depth to the water table and to bedrock. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage and refuse.

Information in this section of the soil survey can be helpful to those who—

1. Select potential residential, industrial, commercial, and recreational areas.

[4] Prepared by THEODORE IFFT, conservation engineer, Soil Conservation Service.

wildlife habitat and for kinds of wildlife—Continued

Elements of wildlife habitat—Continued			Kinds of wildlife		
Wetland food and cover plants	Shallow water developments	Excavated ponds	Open-land	Woodland	Wetland
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Fair	Good	Not suited.
Not suited	Not suited	Not suited	Poor	Good	Not suited.
Not suited	Not suited	Not suited	Poor	Good	Not suited.
Not suited	Not suited	Not suited	Poor	Good	Not suited.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Not suited	Not suited	Not suited	Fair	Good	Not suited.
Not suited	Not suited	Not suited	Poor	Fair	Not suited.
Not suited	Not suited	Not suited	Not suited	Poor	Not suited.
Not suited	Not suited	Not suited	Good	Good	Not suited.
Good	Good	Good	Not suited	Poor	Good.
Good	Poor	Not suited	Not suited	Not suited	Fair.
Good	Good	Good	Fair	Good	Good.
Poor	Not suited	Not suited	Fair	Good	Not suited.
Poor	Not suited	Not suited	Poor	Good	Not suited.
Poor	Poor	Poor	Good	Good	Poor.
Not suited	Not suited	Not suited	Good	Good	Not suited.

2. Evaluate alternate routes for roads, highways, pipelines, and underground cables.
3. Seek sources of gravel, sand, or clay.
4. Plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for controlling water and conserving soil.
5. Correlate performance of structures already built with properties of the kinds of soil on which they are built, for the purpose of predicting performance of structures on the same or similar kinds of soil in other locations.
6. Predict the trafficability of soils for cross-country movement of vehicles and construction equipment.
7. Develop preliminary estimates pertinent to construction in a particular area.

Most of the information in this section is presented in tables 5 and 6 which show, respectively, several estimated soil properties significant to engineering and interpretations for various engineering uses.

This information, along with the soil map and other parts of this survey, can be used to make interpretations in addition to those given in the tables. It also can be used to make other useful maps.

The engineering interpretations reported here do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and where the excavations are deeper than the depths of layers here reported. Estimates generally are made to a depth of about 5 feet, and interpretations do not apply to greater depths. Also, engineers should not apply specific values to the estimates for bearing capacity and traffic-supporting capacity given in this survey. Investigation of each site is needed because delineated areas of a given soil mapping unit can contain small areas of other kinds of soil that have strongly contrasting properties and different suitabilities or limitations for soil engineering. Even in these situations, however, the soil map is useful in planning more detailed investigations and for indicating the kinds of problems that can be expected.

Some of the terms used in this soil survey have special meaning to soil scientists but are not known to all engineers. Many of the terms commonly used in soil science are defined in the Glossary at the back of this survey.

Engineering classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system (*14*) used by the SCS engineers, Department of Defense, and others, and the AASHO system (*1*) adopted by the American Association of State Highway Officials.

TABLE 5.—*Estimated engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soil in structions for referring to other series that appear in the first column of this table. The land types Alluvial land (Av), Clay pits (Cp), Tidal marsh (Tm) are too variable to rate. Urban land mapped in complex with several soil series is also too variable to rate. Symbol >

Soil series and map symbols	Depth to—		Depth from surface [1]	Classification
	Bedrock	High water table		USDA texture
	Feet	*Feet*	*Inches*	
Aldino: AdA, AdB2, AdC2, AsC, AuB Ratings for AuB are for Aldino series only.	3½–6	2	0–6 6–17 17–37 37–60	Silt loam Silt loam, silty clay loam Silt loam, silty clay loam fragipan Loam, silt loam
Baile: BaA, BaB	5–10	0	0–13 13–41 41–60	Silt loam Silt loam, silty clay loam, clay loam. Sandy loam, loam, silt loam
Baltimore: BmA, BmB2, BmC2, BnB Ratings for BnB are for Baltimore series only.	6–10	>5	0–10 10–42 42–72	Silt loam Clay loam, silty clay loam Loam, silt loam
Barclay: Br	>10	1	0–25 25–44 44–60	Silt loam Silt loam, silty clay loam Fine sandy loam, silt loam
Beltsville: BtA, BtB, BtC2, BuB, BuC Ratings for BuB and BuC are for Beltsville series only.	>10	1½–2½	0–18 18–43 43–60	Silt loam Loam, silt loam, silty clay loam Sandy loam, loam, sandy clay loam, clay loam, silt loam.
Brandywine: BwB2, BwC2, ByD2, ByD3, ByE	4–7	>5	0–8 8–20 20–72	Loam, gravelly loam Gravelly loam Gravelly loamy coarse sand, sandy loam.
Captina: CaA, CaB2	>5	1½–3	0–9 9–28 28–44 44–60	Silt loam Silt loam, silty clay loam. Silt loam, silty clay loam fragipan Stratified loam
Chester: CcA, CcB2, CcC2, CgB2, CgC2	5–10	>5	0–11 11–33 33–55	Silt loam Loam, clay loam, silt loam, silty clay loam. Sandy loam, silt loam
*Chillum: ChB2, ChC2, ChC3, CkB2, CkC2, CkD2, ClB, ClD For properties of Neshaminy soils in units CkB2, CkC2, and CkD2, see the Neshaminy series. Ratings for ClB and ClD are for Chillum series only.	>10	>5	0–33 33–50	Silt loam, silty clay loam Gravelly loam, sandy loam, sandy clay loam.
Christiana: CmB, CmC2	>10	>5	0–8 8–24	Loam Silty clay, clay
Chrome: CnB2, CoC3, CoE3	1–3	>5	0–13 13–18 18	Silt loam, silty clay loam, silty clay. Clay loam, silty clay loam Serpentine.
Codorus: Cu	6–20	1½–2	0–52 52–78	Loam, silt loam Stratified silt, gravelly fine sand

See footnotes at end of table.

properties of the soils

such mapping units may have different properties and different limitations, and for this reason it is necessary to follow carefully the in Coastal beaches (Ct), Made land (Ma), Mine dumps and quarries (Mr), Sand and gravel pits (Sg) Stony land, steep (St), Swamp (Sw), and means greater than; symbol < means less than]

Classification—Cont.		Percentage of material larger than 3 inches	Percentage passing sieve—				Permeability range	Available water capacity	Reaction (unlimed)	Shrink-swell potential
Unified	AASHO		No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				
							Inches per hour	*Inches per inch of soil*	*pH*	
ML	A–4	0	95 100	95–100	90–100	80–95	0. 63–6. 3	0. 16–0. 27	4. 5–5. 5	Low.
CL	A–6	0	95–100	90–100	85–100	60–95	0. 63 2. 0	0. 12–0. 24	4. 5–5. 5	Low to moderate.
ML, CL	A–4, A–6	0	85–100	80–100	65–100	50–100	<0. 20	0. 12 0. 24	4. 5–5. 5	Low.
SM, ML, MH	A–2, A–4, A–5.	0–10	85–100	80–100	65–100	30–100	0. 63–2. 0	0. 12–0. 24	5. 0–6. 5	Low.
ML	A–4	0	90–100	90–100	85–100	60–85	0. 20–0. 63	0. 16–0. 27	4. 5–5. 5	Low.
MH, CL	A–6, A–7	0	95–100	90–100	85–100	65–90	<0. 20	0. 12–0. 24	4. 5–5. 5	Low to moderate.
SM, MH	A–4, A–6, A–7.	0	85–100	80–100	75–100	40–85	<0. 20	0. 10–0. 24	4. 5–5. 5	Low.
ML	A–4	0–10	90–100	90–100	75–90	55–70	0. 63–2. 0	0. 18–0. 24	5. 0–6. 0	Low.
ML, CL	A–4, A–6	0–15	85–100	85 100	65–95	55–80	0. 63–2. 0	0. 18–0. 24	5. 0–6. 0	Low to moderate.
ML, CL	A–4, A–6	0–5	85–100	85–100	75–95	50–75	0. 63–2. 0	0. 12–0. 18	5. 0–6. 5	Low.
ML, CL	A 4, A–6	0	95–100	95–100	90–100	55–100	0. 20–0. 63	0. 16–0. 27	4. 0–5. 0	Low.
ML, CL	A–4, A–6	0	95–100	95–100	90–100	60–100	0. 20–0. 63	0. 12–0. 24	4. 0–5. 0	Low.
SM, SC, ML	A–2, A–4, A–6.	0	85–100	80–100	50–100	15–70	0. 63–6. 3	0. 06–0. 18	4. 0–5. 0	Low.
ML	A–4	0	95–100	90–100	75–100	60–90	0. 63–2. 0	0. 18 0. 24	4. 0–5. 0	Low.
ML, CL	A–4, A–6	0	95–100	90–100	90–100	65 95	<0. 20	0. 10–0. 18	4. 0–5. 0	Low.
SM, ML, CL	A–2, A–4, A–6.	0–10	75–100	65 100	55–100	25–80	0. 20–6. 3	0. 08–0. 18	4–0–5. 0	Low.
SM, ML	A–2, A–4	0–25	75–100	60–90	50–75	15–60	2. 0–6. 3	0. 16–0. 23	4. 5–6. 0	Low.
SM, ML	A–2, A–4	15–35	70–100	60–90	40–60	25–60	2. 0–6. 3	0. 06–0. 14	4. 5–5. 5	Low.
SP–SM	A–2, A–3, A–4.	0–25	65–100	50–80	40–60	5–45	2. 0–6. 3	0. 06–0. 12	4. 5–5. 5	Low.
ML, CL	A–4	0	90–100	85–100	80–95	70 95	0. 20–2. 0	0. 18–0. 24	4. 5–6. 0	Low.
ML, CL	A–4, A–6	0	90–100	85–100	80–95	70–95	0. 20–2. 0	0. 14–0. 18	4. 5–5. 5	Moderate.
ML, CL	A 4, A 6	0	90–100	85–100	80–95	70–95	<0. 20	0. 10–0. 14	4. 5–5. 5	Moderate.
SM, SC, ML, CL.	A–4, A–6	0–15	75–100	70–100	65–100	45–90	0. 20–0. 63	0. 10–0. 14	4. 5–5. 5	Low to moderate.
ML	A–4	0–15	90–100	90–100	75–90	55–75	0. 63–2. 0	0. 12–0. 16	5. 0–6. 0	Low.
SM, SC, ML, CL.	A–4, A–5, A–6.	0–10	85–100	85–100	65–95	40–80.	0. 63–2. 0	0. 10–0. 14	5. 0–6. 0	Low.
SM, SC, ML	A–2, A–4, A–5.	0–10	85–100	85–100	75–95	30–65	0. 63–2. 0	0. 08–0. 12	4. 5 5. 5	Low.
ML, CL	A–4, A–6	0	80–100	65–100	60–100	55–90	0. 20–2. 0	0. 18–0. 27	4. 0–5. 0	Low.
SM, SC, GM, GC.	A–2	0–10	60–95	55–90	30–60	15–35	0. 20–2. 0	0. 08–0. 16	4 0–5. 0	Low.
ML	A–4	0	95–100	95–100	95–100	55–90	0. 20–2. 0	0. 18–0. 24	4. 0–5. 0	Low.
CH	A–7	0	95 100	95–100	95–100	90–100	<0. 20	0. 18–0. 24	4. 0–5. 0	Moderate.
MH, CH	A–7	0–5	70–100	65–100	65–100	60–100	0. 63–2. 0	0. 18–0. 24	6. 0–7. 0	Moderate to high.
ML, MH, GM, GC.	A–2, A 7	10–35	30–85	25–75	25–70	20–60	0. 63–2. 0	0. 08–0. 24	6. 0–7. 5	Moderate.
ML, CL, MH	A–4, A–5, A–6.	0	65–100	65–100	60–100	55–95	0. 63–2. 0	0. 12–0. 24	4. 5–5. 5	Low.
Variable	Variable	0–30	Variable.	Variable.	Variable.	Variable.	Variable	Variable	Variable	Variable.

TABLE 5.—*Estimated engineering*

Soil series and map symbols	Depth to—		Depth from surface [1]	Classification
	Bedrock	High water table		USDA texture
	Feet	*Feet*	*Inches*	
Comus: Cv	6–20	>4	0–30	Silt loam
			30–60	Fine sandy loam, loam, strata of silty material, silty clay loam.
Conestoga: CwB2, CwC2	4–10	>5	0–8	Loam
			8–41	Loam, silt loam, clay loam, silty clay loam.
			41–80	Fine sandy loam, loam, silt loam, clay loam with bands of loamy sand.
Delanco: DcB	5–20	2	0–13	Silt loam
			13–39	Loam, clay loam, silt loam, silty clay loam.
			39–72	Very fine sandy loam, loam, clay loam.
Dunning: Du	6–10	0	0–19	Silt loam
			19–37	Silty clay loam, silty clay, clay
			37–48	Clay loam, sandy clay loam, silty clay loam.
			48–60	Stratified gravelly coarse sand
Edgemont: EdB2, EdC2, EgD, EgE	3½–5	>5	0–8	Gravelly loam
			8–34	Gravelly loam, sandy loam, sandy clay loam.
			34–47	Gravelly loam, sandy loam, loamy sand.
			47	Quartzite.
Elioak: EhB2, EhC2, EkB2, EkC2, ElC3	5–10	>5	0–16	Silt loam, silty clay loam.
			16–40	Silty clay, silt loam, silty clay loam.
			40–87	Silt loam, loam, fine sandy loam.
Elkton: Em, En, Eo Ratings for Eo are for Elkton series only.	>10	0–1	0–8	Silt loam
			8–38	Silty clay, silty clay loam
			38–84	Silty clay loam, silt loam, silt
Elsinboro: EsB, EsC2	6–20	>4	0–9	Loam
			9–38	Loam, clay loam, silt loam, silty clay loam.
			38–60	Gravelly sandy loam, fine sandy loam, loam.
Falsington: Fa, Fs	>10	0	0–17	Sandy loam, loam
			17–40	Sandy loam, loam, sandy clay loam.
			40–70	Sand, loamy sand, sandy loam
Fort Mott: FtB	>10	>4	0–28	Loamy sand
			28–34	Sandy loam, light sandy clay loam.
			34–72	Sand, loamy sand
Galestown: GaB, GaC	>10	>10	0–72	Loamy sand, sand
Glenelg: GcB2, GcC2, GcC3, GcD2, GcD3, GgB2, GgC2, GgD2, GgD3, GlB, GlC. Ratings for GlB and GlC are for Glenelg series only.	4–10	>5	0–7	Loam
			7–25	Loam, silt loam, silty clay loam
			25–80	Loam

See footnotes at end of table.

properties of the soils—Continued

Classification—Con.		Percentage of material larger than 3 inches	Percentage passing sieve—				Permeability range	Available water capacity	Reaction (unlimed)	Shrink-swell potential
Unified	AASHO		No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				
							Inches per hour	*Inches per inch of soil*	*pH*	
ML	A-4	0-5	95-100	90-100	70-85	65-80	0. 63-2. 0	0. 18-0. 24	4. 5-6. 0	Low.
SM, ML, CL	A-2, A-4, A-6	0-40	90-100	85-100	55-80	30-65	0. 63-2. 0	0. 12-0. 24	4. 5-6. 0	Low.
ML	A-4	0	90-100	90-100	75-95	55-80	0. 63-2. 0	0. 16 0. 20	5. 5-6. 0	Low.
ML, MH, CH	A-4, A-5, A-6	0-5	90 100	90 100	75-95	55-80	0. 63-2. 0	0. 12-0. 16	5. 0-6. 0	Low.
SM, ML, MH	A-2, A-4, A-5, A-6	0-15	35-90	35-85	35-85	30-80	0. 63-6. 3	0. 06-0. 14	5. 0-7. 5	Low.
ML	A-4	0-5	90-100	85-100	75-90	65-85	0. 63-2. 0	0. 18-0. 24	5. 0-5. 5	Low.
ML, CL	A-4, A-6	0-5	90-100	85-100	80-100	70-95	0. 20-0. 63	0. 18-0. 24	4. 5-5. 0	Low to moderate.
ML, MH	A-4, A-5, A-6	0-15	75-95	65-85	55-75	50-70	0. 63-2. 0	0. 15-0. 22	4. 5-5. 0	Low.
ML, CL	A-4, A-6	0	95-100	90-100	85-100	75-95	0. 20-0. 63	0. 18-0. 27	5. 1-7. 3	Moderate.
CL, CH	A-6, A-7	0	95-100	90-100	85-100	80-100	<0. 20	0. 12-0. 18	6. 1-7. 8	Moderate to high.
ML, CL	A-4, A-6	0-10	95-100	90-100	80-100	65-95	<0. 20	0. 12-0. 18	6. 1-7. 8	Moderate to high.
Variable	Variable	0-30	Variable	Variable	Variable	Variable	Variable	Variable	Variable	Variable.
SM, GM	A-1, A-2, A-4	0-10	55-95	45-90	35-85	15-40	2. 0-6. 3	0. 10-0. 14	4. 5-5. 0	Low.
SM, GM	A-2	0-10	60-90	55-75	45-65	25-35	2. 0-6. 3	0. 08-0. 12	4. 5-5. 0	Low.
SM, GM	A-1, A-2	10-25	55-80	50-75	40-65	15-30	2. 0-6. 3	0. 04-0. 08	4. 5-5. 0	Low.
ML, CL	A-4, A-6	0-5	90-100	90-100	90-100	80-90	0. 63 2. 0	0. 18-0. 24	5. 0-5. 5	Low.
CL, CH, MH	A-4, A-6, A-7	0-5	90-100	90-100	90 100	80-100	0. 63-2. 0	0. 18-0. 24	5. 0-5. 5	Low to moderate.
SM, ML	A-5	0-10	75-100	70-100	70-100	40-65	0. 63-2. 0	0. 12-0. 18	5. 0-5. 5	Low.
ML, CL	A-4, A-6	0	90-100	85-100	80-100	55-90	0. 2. -2. 0	0. 18-0. 27	4. 0-5. 0	Low.
CL, CH, MH	A-6, A-7	0	95-100	80-100	80-100	60 100	<0. 20	0. 18-0. 24	4. 0-5. 0	Moderate.
SM, SC, ML, CL	A-2, A-4, A-6	0	90-100	85-100	65-100	30-100	0. 20-6. 3	0. 12-0. 24	4. 0-5. 0	Low to moderate.
SM, ML	A-4	0	85-100	80-100	75-90	40-75	0. 63-2. 0	0. 12-0. 24	4. 5-5. 5	Low.
SC, ML, CL	A-4, A-6	0	85-100	80-100	65-95	40-85	0. 63-2. 0	0. 12-0. 24	4. 5-5. 5	Low.
SM, SC, ML	A 2, A-4	0-10	60-100	50-100	45-100	30-95	0. 63-6. 3	0. 08-0. 18	4. 5-5. 5	Low.
SM, SC, ML	A-2, A-4	0	95-100	90-100	70-100	20-60	0. 63-6. 3	0. 10-0. 24	4. 0 5. 0	Low.
SM, SC, ML	A-2, A-4	0	95-100	90-100	70-100	20-60	0. 63-2. 0	0. 10-0. 18	4. 0-5. 0	Low.
SM, SP-SM	A-2, A-3	0	90-100	90-100	50-100	5-35	2. 0-6. 3	0. 06-0. 12	4. 0-5. 0	Low.
SM	A-2	0	95-100	90-100	55-80	15-30	2. 0-6. 3+	0. 06-0. 12	4. 0-5. 0	Low.
SM, SC	A-2, A-4	0	95-100	90-100	60-85	25-50	2. 0-6. 3+	0. 12-0. 18	4. 5-5. 5	Low.
SP, SM, SP-SM	A-1, A-2, A-3	0	95-100	90-100	50-80	10-35	2. 0-6. 3+	0. 06-0. 12	4. 5-5. 5	Low.
SP, SM, SP-SM	A-1, A-2, A-3	0	90-100	80-100	50-95	0-20	>6. 3	0. 06-0. 10	4. 0-5. 0	Low.
ML	A-4	0-15	90-100	65-100	60-90	55-85	0. 63-2. 0	0. 14-0. 24	5. 0-6. 0	Low.
SM, ML, CL	A-4, A-6	0-10	85-100	65-100	55-90	35-90	0. 63-2. 0	0. 10-0. 14	5. 0-6. 0	Low.
SM, ML	A-4, A-5	0-10	85-100	65-100	55-90	35-90	0. 63-2. 0	0. 08-0. 12	4. 5-6. 0	Low.

TABLE 5.—*Estimated engineering*

Soil series and map symbols	Depth to—		Depth from surface [1]	Classification
	Bedrock	High water table		USDA texture
	Feet	*Feet*	*Inches*	
Glenville: GnA, GnB, GuB Ratings for GuB are for Glenville series only.	4–10	1–3	0–10	Silt loam
			10–16	Loam, silt loam, silty clay loam
			16–34	Loam, silt loam, silty clay loam fragipan.
			34–72	Loam, silt loam, fine sandy loam
Hagerstown: HaA, HaB2, HaC2	4–7	>4	0–9	Silt loam
			9–80	Clay, silty clay, clay loam, silty clay loam.
Hatboro: Hb	6–20	0	0–14	Silt loam
			14–43	Silt loam, silty clay loam
			43–60	Sandy loam, loam, sandy clay loam, silt loam, silty clay loam.
Hollinger: HoB2, HoC2, HrD3, HsC For properties of Conestoga soils in units HrD3 and HsC, see the Conestoga series.	4–8	>5	0–16	Loam, silt loam
			16–31	Loam, silt loam
			31–102	Sand, sandy loam
Iuka: Iu	>10	1–2	0–41	Silt loam
			41–60	Loam, sandy loam
Joppa: JpB, JpC2, JpD2, JuD Ratings for JuD are for Joppa series only.	>10	>5	0–23	Gravelly sandy loam, loam
			23–72	Gravelly sand, loamy sand
Kelly: KeB2, KeC2, KsC, KuB Ratings for KuB are for Kelly series only.	3½–5	1–2	0–10	Silt loam
			10–32	Clay, clay loam
			32–54	Clay loam, sandy clay loam
Legore: LeB2, LeC2, LeD2, LeE, LfC, LfD, LfE, LgC3, LgD3, LhB, LhC. Ratings for LhB and LhC are for Legore series only.	>4	>4	0–8	Silt loam, silty clay loam
			8–25	Clay loam, silty clay loam
			25–48	Loam, silt loam, clay loam, silty clay loam.
Lenoir: LlB, LmB, LmC2, LnC3, LoB Ratings for LoB are for Lenoir series only.	>10	1½–2½	0–8	Loam, silt loam
			8–36	Clay, silty clay loam, silty clay
			36–60	Silty clay, silty clay loam
Leonardtown: Lr	>10	0	0–13	Silt loam
			13–58	Silt loam, silty clay loam fragipan
			58–74	Loam, silt loam, silty clay loam
Lindside: Ls	>6	1½–3	0–41	Silt loam
			41–60	Silty clay loam
Loamy and clayey land: LyB, LyD, LyE	>10	>5	(2)	Sandy loam to silt loam
			(2)	Clay, silty clay, sandy clay
*Manor: MbB2, MbC2, MbC3, MbD2, MbD3, McB2, McC2, McC3, McD2, McD3, MdE, MeD, MgC, MhD, MhE. For properties of Brandywine soils in units MhD, and MhE and properties of Glenelg soils in MgC see Brandywine and Glenelg series. Ratings for MeD are for Manor series only.	3½–10	>5	0–22	Loam
			22–83	Loam, sandy loam
Matapeake: MkA, MkB, MkC2	>10	>4	0–16	Silt loam
			16–30	Silt loam, silty clay loam
			30–62	Sand, loamy sand, sandy loam

See footnotes at end of table.

properties of the soils—Continued

Classification—Con.		Percentage of material larger than 3 inches	Percentage passing sieve—				Permeability range	Available water capacity	Reaction (unlimed)	Shrink-swell potential
Unified	AASHO		No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				
							Inches per hour	*Inches per inch of soil*	*pH*	
ML, CL	A-4	0–5	85–100	85–95	75–85	65–80	0. 63–2. 0	0. 16–0. 20	5. 0–5. 5	Low.
ML, CL	A-4, A-6	0–5	85–100	85–100	80 95	65–90	0. 63–2. 0	0. 12–0. 16	4. 5–5. 5	Low.
ML, CL	A-4	0–5	85–100	85–100	80–100	65–90	0. 20–0. 63	0. 10–0. 14	4. 5–5. 5	Low.
SM, SC, ML	A-4	0–10	75–90	75 90	65–85	40–75	0. 63–2. 0	0. 10–0. 14	4. 5–5. 0	Low.
ML, MH, CL	A-4, A-6	0	95–100	95–100	80–100	70–95	0. 63–2. 0	0. 16–0. 24	5. 5–7. 3	Low.
MH, CL, CH	A-6, A-7	0–5	90–100	90 100	75–100	70–95	0. 63–2. 0	0. 10–0. 24	5. 0–6. 5	Moderate.
ML, CL	A-4, A-6	0–5	95–100	95–100	80–100	70–90	0. 63–2. 0	0. 16–0. 20	4. 5–5. 5	Low.
ML, CL	A-4, A-6	0–5	65–100	60–100	55–95	55–70	0. 63–2. 0	0. 14–0. 18	4. 5–5. 5	Low.
SM, GM, ML, CL.	A-1, A-2, A-4, A-6	0–20	50–85	45 80	45–80	15–70	2. 0–6. 3	0. 06–0. 20	4. 5–5. 5	Low.
ML	A-4, A-5	0–10	70–100	60–100	60–85	50–75	0. 63–2. 0	0. 18–0. 24	6. 0–7. 3	Low.
ML, MH	A-4, A-5	0–10	75–100	65–95	65–85	60–80	0. 63–2. 0	0. 18–0. 24	6. 0–7. 3	Low.
SP, SM	A-2, A-3	0–15	80–100	60–90	40–60	5–35	0. 63–6. 3	0. 12–0. 18	6. 0–7. 3.	Low.
ML	A-4	0	95–100	90–100	75–100	50–75	0. 63–2. 0	0. 18–0. 24	4. 0–5. 0	Low.
SM, ML	A-2, A-4	0–10	50–100	45–100	40–95	20–70	0. 63–6. 3	0. 12–0. 24	4. 0–5. 0	Low.
SM, GM	A-1, A-2, A-4	0–10	40–80	30–70	30–65	15–45	0. 63–6. 3	0. 12–0. 18	4. 0–5. 0	Low.
GP, GM, GP-GM.	A-1, A-2	0 10	40–80	35–60	30–60	5–15	2. 0–6. 3	0. 06–0. 10	4. 0–5. 0	Low.
ML, CL	A-4, A-6	0–10	95–100	95–100	90–100	80–100	0. 20–2. 0	0. 16–0. 27	5. 0–6. 0	Moderate.
MH, CL, CH	A-6, A-7	0–10	95–100	95–100	90–100	90–100	<0. 20	0. 16–0. 24	5. 0–6. 0	High.
SC, CL	A-4, A-6	0–10	85–100	80–100	80–100	45–90	0. 20–0. 63	0. 14–0. 24	6. 0–7. 0	Moderate to high.
ML, CL	A-4, A-6	0–15	90–100	90–100	80–100	55–85	0. 20–6. 3	0. 14–0. 24	5. 0–6. 0	Low.
ML, MH, CL	A-4, A-6, A-7	0 15	90–100	90 100	75–100	60–85	0. 63–2. 0	0. 12–0. 24	5. 5–6. 5	Low to moderate.
ML, CL	A-4, A-6	0–15	85–100	70–100	60–95	50–85	0. 63–6. 3	0. 10–0. 18	5. 5–6. 5	Low to moderate.
SM, ML, CL	A-4, A-6	0	95–100	90–100	70 100	40–100	0. 20–2. 0	0. 12–0. 24	4. 0–5. 0	Low to moderate.
MH, CL, CH	A-6, A-7	0	85–100	75–100	70–100	65–100	<0. 20	0. 10–0. 24	4. 0–5. 0	Moderate to high.
ML, CL, CH	A-4, A-6, A-7	0	90–100	80–100	70–100	60–95	0. 20–0. 63	0. 10–0. 16	4. 0–5. 0	Low to moderate.
ML	A-4	0	95–100	95–100	95–100	90–100	0. 20–0. 63	0. 18–0. 24	4. 0–5. 0	Low.
ML, CL	A-4, A-6	0	95–100	95–100	90–100	80–100	<0. 20	0. 18–0. 24	4. 0–5. 0	Low.
ML, CL	A-4, A-6	0	90–100	85–95	70 95	60–85	0. 20–2. 0	0. 12–0. 24	4. 0–5. 0	Low.
ML, CL	A-4, A-6	0	95–100	95–100	90–100	70–90	0. 20–2. 0	0. 18 0. 24	5. 5–7. 3	Low.
CL	A-6	0–10	90–100	85–100	80–95	75–90	0. 20–2. 0	0. 14–0. 20	5. 5–7. 3	Low.
SM, ML	A-2, A-4	0	95–100	95–100	90–100	30–90	0. 20–6. 3	0. 12–0. 24	4. 0–5. 0	Low.
CL, CH	A-7	0	95–100	95–100	85–100	60 100	<0. 20	0. 12–0. 20	4. 0–5. 0	Moderate to high.
SM, ML	A-4, A-5	0–10	60 100	55–100	50–90	40–80	0. 63–2. 0	0. 06–0. 12	4. 5–5. 5	Low.
SM, ML	A-2, A-4, A-5	0–5	60–100	60–100	50–70	30–60	0. 63–6. 3	0. 06–0. 10	4. 5–5. 5	Low.
ML, CL	A-4, A-6	0	95–100	95–100	80–100	55–90	0. 63–2. 0	0. 14–0. 24	4. 5–5. 0	Low.
ML, CL	A-4, A-6, A-7	0	95–100	95 100	80–100	65–90	0. 63–2. 0	0. 18–0. 24	4. 5–5. 0	Low.
SM, SC, ML	A-2, A-4	0	95–100	95–100	60–100	15–60	0. 63–6. 3	0. 06–0. 18	4. 5–5. 0	Low.

TABLE 5.—*Estimated engineering*

Soil series and map symbols	Depth to—		Depth from surface [1]	Classification
	Bedrock	High water table		USDA texture
	Feet	*Feet*	*Inches*	
Mattapex: MIA, MIB, MmB Ratings for MmB are for Mattapex series only.	>10	1½–2½	0–9	Silt loam
			9–36	Silt loam, silty clay loam
			36–72	Loamy sand to silt loam
Melvin: Mn, Mo	>6	0	0–40	Silt loam, silty clay loam
			40–54	Sandy loam, silt loam
Montalto: MsB2, MsC2	5–12	>5	0–9	Silt loam
			9–54	Clay, clay loam, silty clay loam, silty clay.
			54–60	Loam, clay loam, silty clay loam
Mt. Airy: MtB2, MtC2, MtD2, MtD3	2–3	>5	0–7	Channery loam
			7–40	Channery loam
			40	Schist.
Neshaminy: NeB2, NeC2	4–10	>4	0–7	Silt loam
			7–40	Clay loam, silty clay loam
			40–60	Sandy loam, loam, silt loam, clay loam.
Othello: Ot	>10	0	0–10	Silt loam
			10–34	Silt loam, silty clay loam
			34–46	Sandy loam, loamy fine sand
			46–74	Silty clay
Pocomoke: Po	>10	0	0–40	Sandy loam
			40–60	Loamy sand, sand
Relay: ReC2, ReD2, RsD, RsE, RyD3	4–7	>5	0–5	Silt loam, clay loam
			5–20	Clay loam, silty clay loam
			20–84	Loam to very fine sandy loam
*Sassafras: ShA, ShB, ShC2, ShC3, ShD2, SlA, SlB, SlC2, SnB, SsD3, SsE. For properties of Joppa soils in units SsD3 and SsE, see Joppa series. Ratings for SnB are for Sassafras series only.	>10	>4	0–16	Sandy loam, loam
			16–33	Snady clay loam, sandy loam, loam.
			33–74	Sandy loam, loamy sand, sand
Sunnyside: SuB2	>10	>5	0–10	Fine sandy loam
			10–40	Sandy clay loam, sandy loam, loam.
			40–50	Sandy loam, loamy sand, fine sand.
Watchung: WaA, WaB, WcB	>5	0	0–12	Silt loam
			12–42	Clay, silty clay, silty clay loam
			42–72	Silt loam, loam, silty clay loam, sandy clay loam.
Woodstown: WdA, WdB, WoA, WoB	>10	1½–2½	0–9	Sandy loam, loam
			9–37	Sandy clay loam, loam, sandy loam.
			37–60	Sandy loam, loamy sand, sand

[1] Depths given are for the representative profile (see descriptions of the soils). For any given layer, the figures are estimates of the range of the series within the county.

properties of the soils—Continued

Classification—Con.		Percentage of material larger than 3 inches	Percentage passing sieve—				Permeability range	Available water capacity	Reaction (unlimed)	Shrink-swell potential
Unified	AASHO		No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				
							Inches per hour	*Inches per inch of soil*	*pH*	
ML, CL	A–4	0	95–100	95–100	80–100	55–90	0. 20–2. 0	0. 14–0. 24	4. 0–5. 5	Low.
ML, CL	A–4, A–6	0	95–100	95–100	80–100	60–100	0. 20–0. 63	0. 18–0. 24	4. 5–5. 5	Low.
SM, SC, ML, CL	A–2, A–4, A–6	0–5	95–100	95–100	60–100	15–60	0. 63–6. 3	0. 10–0. 16	4. 0–5. 0	Low.
ML, CL	A 4, A 6	0	90–100	90 100	90 100	65–90	0. 20–0. 63	0. 18–0. 22	5. 5–7. 3	Low to moderate.
SM, ML, CL	A–2, A–4, A–6	0–10	70–100	70–100	65–85	25–80	0. 20–2. 0	0. 10–0. 18	5. 5 7. 3	Low.
ML, CL	A–4, A–6	0–5	95–100	95–100	80–100	75–100	0. 63–2. 0	0. 18–0. 24	4. 5–6. 5	Low.
MH, CL, CH	A–6, A–7	0–5	95–100	95–100	80–100	65–100	0. 20–0. 63	0. 08–0. 12	5. 0–6. 0	Moderate to high.
SM, MH, ML, CL	A–4, A–6, A–7	0–10	85–100	75–100	60–100	45 75	0. 63–2. 0	0. 08–0. 12	5. 0–6. 0	Low to moderate.
GM, ML	A–2, A–4	0–5	40–60	40–60	25–60	20–55	0. 63–2. 0	0. 12–0. 18	4–5–5. 5	Low.
GM	A–2	0–15	35–50	30–50	25–40	15–25	0. 63–2. 0	0. 08–0. 12	4–5–5. 5	Low.
ML, CL	A–4, A–6	0–10	80–100	80–100	70–100	65–90	0. 63–2. 0	0. 14–0. 24	5. 0–6. 0	Low.
ML, CL	A–4, A–5, A–6	0–10	80–100	80–100	70–100	65–90	0. 63–2. 0	0. 18–0. 24	5. 0–6. 0	Low to moderate.
SM, SC, ML, CL	A 2, A–4, A–6	0–25	50–100	50–100	40–95	30 85	0. 63–2. 0	0. 09–0. 20	4. 5–6. 0	Low.
ML, CL	A–4, A–6	0	95–100	95–100	90–100	60–100	0. 63–2. 0	0. 16–0. 27	4. 0–5. 0	Low.
ML, CL	A–4, A–6	0	95–100	95–100	90–100	60–100	0. 20–0. 63	0. 12–0. 24	4. 0–5. 0	Low.
SM, SC	A–2, A–4	0	85–100	80–100	50–100	15–70	0. 63–6. 3	0. 06–0. 12	4. 0–5. 0	Low.
ML, CL	A–6, A–7	0	95–100	95–100	90–100	80–100	0. 20–0. 63	0. 12–0. 24	4. 0–5. 0	Low to moderate.
SM	A–2, A–4	0	95–100	95–100	80–100	20–45	0. 63–2. 0	0. 12–0. 24	4. 0–5. 0	Low.
SM, SP–SM	A–2, A–3	0	95–100	90–100	75–90	5–30	2. 0–6. 3+	0. 06–0. 10	4. 0–5. 0	Low.
ML, CL	A–4, A–6	0–5	85–95	80–90	80–90	65–85	0. 20–2. 0	0. 18–0. 24	5. 0–6. 0	Low.
CL	A–6	0–5	85–95	80–90	80–90	70–85	0. 63–2. 0	0. 18–0. 24	5. 5–6. 5	Low to moderate.
SM, ML	A–4, A–5	0–10	85–95	80–90	75–85	40–85	0. 63–2. 0	0. 18 0. 24	5. 5–6. 5	Low.
SM, ML	A–2, A–4	0	80–100	80–100	60–100	15–65	0. 63–6. 3	0. 08–0. 24	4. 0–5. 0	Low.
SM, SC, ML, CL	A–2, A–4, A–6	0	75–100	55 100	50 100	25–75	0. 63–2. 0	0. 08–0. 24	4. 0–5. 0	Low.
SM, SP–SM	A–1, A–2	0	70–100	60–100	50–80	10–30	0. 63–6. 3	0. 04–0. 12	4. 0–5. 0	Low.
SM, ML	A–2, A–4	0	95–100	95–100	90–100	30–60	0. 63–6. 3	0. 12–0. 18	4. 0–5. 0	Low.
SC, CL	A–4, A–6	0	95–100	95–100	85–100	35–55	0. 63–2. 0	0. 18–0. 24	4. 0–5. 0	Low.
SM, SC	A–2, A–4	0	95–100	95–100	80–100	20–45	0. 63–6. 3	0. 08–0. 18	4. 0–5. 0	Low.
ML, CL	A–4, A–6	0–5	85–100	80–100	70–100	60–100	0. 20–2. 0	0. 14–0. 28	4. 5–6. 5	Low.
MH, CL, CH	A–6, A–7	0–5	80–100	75–100	70–100	65–100	<0. 20	0. 10–0. 24	5. 0–7. 3	Moderate.
ML, CL, SC	A–4, A–6	0–10	75–100	70–100	50–100	40–100	0. 20–2. 0	0. 12–0. 24	5. 5–7. 3	Moderate.
SM, SC, ML	A–2, A–4	0	90–100	90–100	45–100	15–75	0. 63–6. 3	0. 08–0. 24	4. 0–5. 0	Low.
SM, SC, ML, CL	A–2, A–4, A–6	0	95–100	90–100	70–100	25–75	0. 63–2. 0	0. 10–0. 24	4. 0–5. 0	Low.
SM, SP–SM	A–1, A–2, A–3	0	60–100	55 100	40–90	5–30	0. 63–6. 3	0. 06–0. 12	4. 0–5. 0	Low.

[2] In Loamy and clayey land, the thickness of each of the layers described is too variable to be given even an approximate figure. In general, the first or surface layer ranges from 2 to 3 inches to 3 or 4 feet and the second layer extends to 5 feet or more.

TABLE 6.—*Engineering interpretations*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in referring to other series carefully. The land types Alluvial land (Av), Clay pits (Cp), Coastal beaches (Ct), Made land (Ma), Mine Urban land mapped in complex with several soil series is also too variable to interpret]

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Roadfill	Highway and road location	Ponds: Reservoir area
Aldino: AdA, AdB2, AdC2, AsC, AuB. Ratings for AuB are for Aldino series only.	Fair to depth of 10 inches.	Unsuitable; none present.	Fair; A–4, A–5, A–6; some A–2 material may be present in substratum.	Seasonally perched water table at depth of 2 feet; high potential for frost action.	Seasonally perched water table at depth of 2 feet; bedrock at depth of 3½ to 6 feet.
Baile: BaA, BaB	Fair to depth of 9 inches; seasonal high water table at surface.	Unsuitable; too many fines.	Poor; A–6, A–7; low to moderate shrink-swell potential.	Seasonal high water table at surface; seepage from higher areas; high potential for frost action.	Seasonal high water table at surface.
Baltimore: BmA, BmB2, BmC2, BnB. Ratings for BnB are for Baltimore series only.	Good to depth of 12 inches; may contain coarse fragments.	Fair to poor for gravel in surface layer; no gravel below surface layer; no sand.	Fair; A–4, A–6, A–7; moderate shrink-swell potential.	Bedrock at depth of 6 to 10 feet; limestone boulders; moderate potential for frost action.	Permeable materials; sinks and solution channels.
Barclay: Br	Fair; seasonal high water table at depth of 1 foot.	Fair for sand below depth of 3 feet; unsuitable for gravel.	Fair; A–4, A–6, A–2.	Seasonal high water table at depth of 1 foot; high potential for frost action; local ponding.	Seasonal high water table at depth of 1 foot; moderate seepage in subsoil; rapid seepage in substratum.
Beltsville: BtA, BtB, BtC2, BuB, BuC. Ratings for BuB and BuC are for Beltsville series only.	Fair	Unsuitable; silty materials.	Poor to fair; A–6, A–2.	Seasonally perched water table at depth of 1½ to 2½ feet; high potential for frost action; seepage problems in cuts; cuts and fills needed.	Slow seepage in fragipan; variable seepage in substratum.
Brandywine: BwB2, BwC2, ByD2, ByD3, ByE.	Fair to depth of 10 inches; coarse fragments locally.	Poor to unsuitable; variable amounts coarse sandy material in substratum.	Good; A–2, A–3, A–4.	Bedrock at depth of 4 to 7 feet; low to moderate potential for frost action; cuts and fills needed.	Pervious materials
Captina: CaA, CaB2	Fair to depth of 8 inches.	Unsuitable	Fair; A–4, A–6; seasonally perched water table.	Seasonally perched water table; moderate potential for frost action; seepage above fragipan.	Possible pervious layers in substratum.

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such mapping units may have different properties and different limitations, and for this reason it is necessary to follow the instructions for dumps and quarries (Mr), Sand and gravel pits (Sg), Stony land, steep (St), Swamp (Sw), and Tidal marsh (Tm) are too variable to interpret.

Soil features affecting—Continued						
Ponds—Continued Embankment	Drainage	Sprinkler irrigation	Terraces or diversions	Grassed waterways	Winter grading	Pipeline construction and maintenance
Poor to fair stability and compaction; fair to poor resistance to piping.	Seasonally perched water table at depth of 2 feet; slow permeability.	Moderate intake rates and moderate moisture-holding capacity.	Seasonally perched water table at depth of 2 feet; bedrock at depth of 3½ to 6 feet.	Moderate moisture-holding capacity.	Seasonally perched water table at depth of 2 feet; poor trafficability; high silt content.	Seasonally perched water table at depth of 2 feet; bedrock at depth of 3½ to 6 feet.
Fair to poor stability; fair to very poor compaction; fair resistance to piping	Seasonal high water table at surface; slow permeability.	Drainage needed; seasonal high water table at surface; slow permeability.	Not needed on this soil.	Seasonal high water table at surface; seepage from higher areas.	Seasonal high water table at surface; very poor trafficability.	Seasonal high water table at surface; seepage from higher areas.
Fair to poor stability and compaction; fair resistance to piping.	Not needed; well drained.	Moderate intake rate and permeability; high moisture-holding capacity.	Fair to poor stability; erodible; limestone boulders.	High moisture-holding capacity; moderate fertility; limestone boulders.	Fair trafficability; sticky plastic material.	Bedrock at depth of 6 to 10 feet; limestone boulders; plastic material.
Fair stability; fair to good compaction; fair to poor resistance to piping.	Seasonal high water table at depth of 1 foot; moderate permeability.	Drainage needed; moderate intake rate; moderate permeability; high moisture-holding capacity; running sand substratum.	Not needed on this soil.	Seasonal high water table at depth of 1 foot.	Poor trafficability; seasonal high water table at depth of 1 foot.	Seasonal high water table at depth of 1 foot.
Fair stability and compaction; fair to poor resistance to piping.	Seasonally perched water table; slow permeability; fragipan.	Drainage needed; moderate moisture-holding capacity; moderate intake rate; slow permeability.	Seepage above fragipan; fair stability; highly erodible; low fertility.	Seepage above fragipan; low moisture-holding capacity; highly erodible.	Poor trafficability; seasonally perched water table at depth of 1½ to 2½ feet.	Seasonally perched water table at depth of 1½ to 2½ feet; seepage plane at depth of 2 to 3 feet; trenches subject to caving.
Fair to poor stability and compaction; poor resistance to piping.	Not needed; well drained.	Moderate to moderately rapid intake rate; low moisture-holding capacity.	Fair to poor stability.	Low moisture-holding capacity.	Fair to good trafficability.	Bedrock at depth of 4 to 7 feet.
Fair stability; erodible.	Slow permeability; seasonally perched water table.	Drainage needed; slow intake rate.	Seasonally perched water table.	Seasonally perched water table.	Seasonally perched water table; large clods.	Seasonally perched water table; seepage above fragipan.

TABLE 6.—*Engineering interpretations*

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Roadfill	Highway and road location	Ponds: Reservoir area
Chester: CcA, CcB2, CcC2, CgB2, CgC2.	Good to depth of 12 inches; gravel and channery phases.	Unsuitable.	Fair to good; A–6, A–5, A–4, A–2; mica content increases below depth of 3 feet.	Substratum has high mica content; stones present in places; moderate frost action; cuts and fills needed.	Pervious substratum.
*Chillum: ChB2, ChC2, ChC3, ClB, ClD, CkB2, CkC2, CkD2. For interpretations of Neshaminy soils in units CkB2, CkC2, and CkD2, see Neshaminy series. Ratings for ClB, and ClD are for Chillum series only.	Good.	Unsuitable to depth of 28 inches; fair below depth of 28 inches.	Fair above depth of 28 inches; good below; A–4, A–6, A–2.	Low to moderate potential for frost action; cuts and fills needed.	Pervious substratum.
Christiana: CmB, CmC2.	Fair to depth of 7 inches.	Unsuitable.	Very poor; A–7; moderate shrink-swell potential.	Moderate potential for frost action; cuts and fills needed; cut slopes tend to be unstable and are hard to vegetate; plastic materials.	Plastic; slowly permeable materials.
Chrome: CnB2, CoC3, CoE3.	Poor; low productivity.	Unsuitable; many fines.	Poor; A–7, moderate to high shrink-swell potential; some A–2 materials below depth of 1½ feet.	Bedrock at depth of 1 to 3 feet; moderate potential for frost action.	Moderate permeability; bedrock at depth of 1 to 3 feet.
Codorus: Cu	Fair to depth of more than 18 inches; seasonal high water table at depth of 1½ to 2 feet.	Poor to unsuitable; deep overburden when present; limited quantity.	Poor; A–6, A–5, A–4; low to moderate shrink-swell potential.	Seasonal high water table at depth of 1½ to 2 feet; flooding hazard; high potential for frost action.	Seasonal high water table at depth of 1½ to 2 feet; pervious substratum.
Comus: Cv	Good to depth of 35 inches.	Unsuitable; locally small amounts of sand below depth of 42 inches.	Fair to poor; A–4, A–6; underlying materials variable; A–2, A–4, A–6.	Subject to flooding; moderate to high potential for frost action.	Pervious substratum; flooding hazard.
Conestoga: CwB2, CwC2.	Good to depth of 15 inches; fair below.	Unsuitable; locally small amounts below depth of 42 inches.	Fair to poor; A–5, A–6, A–7; moderate shrink-swell potential; can be underlain by thin horizon of A–2, A–4 materials.	Moderate potential for frost action; cuts and fills needed.	Moderate permeability.

of the soils—Continued

Soil features affecting—Continued						
Ponds—Continued Embankment	Drainage	Sprinkler irrigation	Terraces or diversions	Grassed waterways	Winter grading	Pipeline construction and maintenance
Fair stability and compaction; substratum micaceous; fair to poor resistance to piping.	Not needed; well drained.	Moderate intake rate; high moisture-holding capacity.	Fair stability....	High moisture-holding capacity.	Fair trafficability.	Stones present in some areas.
Fair stability; fair to good compaction; fair resistance to piping.	Not needed; well drained.	Moderate intake rate; moderate permeability; moderate moisture-holding capacity.	Features generally favorable.	Features generally favorable.	Good trafficability.	Features generally favorable.
Very poor stability; poor compaction; high compressibility; good resistance to piping; highly erodible.	Not needed; well drained.	Slow intake rate; slow permeability; high moisture-holding capacity.	Very poor stability; plastic materials; difficult to vegetate.	Plastic materials; difficult to vegetate.	Poor trafficability; plastic materials.	Plastic materials; trenches subject to caving when wet.
Fair to poor stability and compaction; limited borrow; fair to good resistance to piping.	Not needed; well drained.	Moderate intake rate; low to moderate moisture-holding capacity.	Fair to poor stability; bed. rock at depth of 1 to 3 feet.	Low to moderate moisture-holding capacity.	Fair to poor trafficability; plastic materials.	Plastic materials, bedrock at depth of 1 to 3 feet.
Fair to poor stability and compaction; fair to poor resistance to piping.	Seasonal high water table at depth of 1½ to 2 feet; flooding hazard; outlet problem.	Seasonal high water table at depth of 1½ to 2 feet; moderate intake rate; flooding hazard.	Not needed on this soil.	Seasonal high water table at depth of 1½ to 2 feet flooding hazard.	Poor to very poor trafficability; flooding hazard; seasonal high water table at depth of 1½ to 2 feet.	Seasonal high water table at depth of 1½ to 2 feet; flooding hazard; caving hazard.
Fair to poor stability and compaction; poor resistance to piping.	Not needed; well drained.	Moderate intake rate; high moisture-holding capacity.	Not needed.....	High moisture holding capacity and fertility.	Fair to poor trafficability; flooding hazard.	Flooding hazard.
Fair to poor stability and compaction; fair to poor resistance to piping.	Not needed; well drained.	Moderate intake rate; moderate permeability; high moisture-holding capacity.	Fair to poor stability.	High moisture-holding capacity; moderate fertility.	Fair trafficability.	All features favorable.

TABLE 6.—*Engineering interpretations*

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Roadfill	Highway and road location	Ponds: Reservoir area
Delanco: DcB	Fair to depth of 11 inches; some ponding.	Unsuitable; none present.	Fair to poor; A–4, A–6, A–7; low to moderate shrink-swell potential.	Seasonal high water table at depth of 2 feet; high potential for frost action.	Seasonal high water table at depth of 2 feet; seepage looses in variable substratum.
Dunning: Du	Fair to depth of 15 inches; high water table.	Unsuitable; none present.	Poor; A–4, A–6, A–7; high water table.	Flooding hazard; high water table; poor stability; high potential for frost action.	Flooding hazard.
Edgemont: EdB2, EdC2, EgD, EgE.	Fair to poor; variable coarse-fragment content.	Poor to unsuitable; stony and too many fines.	Good; coarse-fragment content increases with depth.	Bedrock at depth of 3½ to 5 feet; cuts and fills needed.	Moderately rapid permeability; bedrock at depth of 3½ to 5 feet.
Elioak: EhB2, EhC2, EkB2, EkC2, ElC3.	Good to depth of 12 inches.	Unsuitable; none present.	Poor; A–4, A–6, A–7; moderate shrink-swell potential; mica content increases with depth.	Soft micaceous substratum at depth of 3 feet to more than 10 feet; moderate potential for frost action; cuts and fills needed.	Pervious substratum.
Elkton: Em, En, Eo. Ratings for Eo are for Elkton series only.	Poor to fair to depth of 10 inches.	Unsuitable.	Poor; A–6, A–7, A–2; moderate to high shrink-swell potential.	Seasonal high water table at depth of 0 to 1 foot; high potential for frost action; plastic; local ponding.	Seasonal high water table at depth of 0 to 1 foot; impervious material.
Elsinboro: EsB, EsC2	Good	Unsuitable to depth of 3 feet; locally fair below depth of of 3 feet.	Fair to good; A–4, A–6, A–2.	Moderate potential for frost action.	Moderate seepage in subsoil; pervious substratum.
Fallsington: Fa, Fs	Fair; seasonal high water table at depth of 0 to 1 foot.	Fair for sand below depth of of 30 inches; unsuitable for gravel.	Good to fair; A–2, A–4, A–3.	Seasonal high water table at depth of 0 to 1 foot; high potential for frost action; running sand substratum; local ponding.	Seasonal high water table at depth of 0 to 1 foot; moderate seepage in subsoil; pervious substratum.
Fort Mott: FtB	Fair	Fair for sand below depth of 3 feet; unsuitable for gravel.	Fair to good; A–2, A–4.	Features generally favorable; cuts and fills needed.	Moderate seepage in subsoil; rapid seepage in substratum.

of the soils—Continued

Soil features affecting—Continued						
Ponds—Continued	Drainage	Sprinkler irrigation	Terraces or diversions	Grassed waterways	Winter grading	Pipeline construction and maintenance
Embankment						
Fair to poor stability and compaction; fair resistance to piping.	Seasonal high water table at depth of 2 feet; moderately slow permeability.	Moderate intake rate; moderately slow permeability.	Fair to poor stability.	High moisture-holding capacity; moderate fertility.	Fair trafficability; seasonal high water table at depth of 2 feet.	Seasonal high water table table at depth of 2 feet.
Poor stability; erodible.	Flooding hazard; high water table; outlet problems; slow permeability.	Drainage needed; slow intake rate; flooding hazard.	Not applicable.	High water table; flooding hazard.	High water table; flooding hazard; large clods.	High water table; floodin hazard.
Fair stability; fair to good compaction; poor resistance to piping.	Not needed; well drained.	Moderately rapid intake rate and permeability.	Fair stability; coarse fragments.	Moderate to high moisture-holding capacity.	Fair to good trafficability.	Bedrock at depth of 3½ to 5 feet.
Fair to poor stability and compaction; fair to good resistance to piping.	Not needed; well drained.	Moderate intake rate and permeability; high moisture-holding capacity.	Fair to poor stability; erodible.	High moisture-holding capacity and fertility.	Fair trafficability; plastic when wet.	Deeply weathered micaceous substratum; plastic subsoil in places.
Plastic material; poor stability; poor to fair compaction; moderate to high compressibility; good resistance to piping.	Seasonal high water table at depth of 0 to 1 foot; slow permeability.	Drainage needed; slow intake rate; slow permeability; high moisture-holding capacity.	Poor stability; plastic material; difficult to vegetate; seasonal high water table at depth of 0 to 1 foot.	Seasonal high water table at depth of 0 to 1 foot; plastic material; difficult to vegetate.	Very poor trafficability; seasonal high water table at depth of 0 to 1 foot; plastic material.	Seasonal high water table at depth of 0 to 1 foot; poor stability; plastic material.
Fair stability; fair to good compaction; fair to good resistance to piping.	Not needed; well drained.	Moderate intake rate; moderate permeability; high moisture-holding capacity.	Features generally favorable.	Features generally favorable.	Good trafficability.	Features generally favorable.
Fair stability; fair to good compaction; poor resistance to piping.	Seasonal high water table at depth of 0 to 1 foot; moderate permeability; running sand in substratum.	Drainage needed; moderate intake rate; moderate permeability; moderate to high moisture-holding capacity.	Not needed on this soil.	Seasonal high water table at depth of 0 to 1 foot; moderate to high moisture-holding capacity.	Poor trafficability; seasonal high water table at depth of 0 to 1 foot.	Seasonal high water table at depth of 0 to 1 foot; trenches subject to caving; running sand in substratum.
Fair stability; fair to good compaction; poor resistance to piping.	Not needed; well drained.	Rapid intake rate; moderately rapid permeability; low moisture-holding capacity.	Fair stability; low fertility and mositure-holding capacity.	Low moisture-holding capacity; low fertility.	Good trafficability.	Fair stability; sandy substratum tends to cave.

TABLE 6.—*Engineering interpretations*

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Roadfill	Highway and road location	Ponds: Reservoir area
Galestown: GaB, GaC	Poor; sandy materials.	Good to fair for sand; locally good to fair for gravel.	Good if soil binder is added; A-1, A 2, A-3.	Loose sand; hauling hindered; subject to soil blowing; cuts and fills needed; cuts are droughty and difficult to vegetate.	Excessive seepage.
Glenelg: GcB2, GcC2, GcC3, GcD2, GcD3, GgB2, GgC2, GgD2, GgD3, GlB, GlC. Ratings for GlB and GlC are for Glenelg series only.	Fair to depth of 8 inches; some coarse fragments.	Unsuitable; none present.	Poor to fair; A-4, A-5, A-6; mica content increases with depth.	Highly micaceous substratum; moderate potential for frost action; cuts and fills needed.	Seepage in pervious substratum.
Glenville: GnA, GnB, GuB. Ratings for GuB are for Glenville series only.	Fair to depth of 9 inches; seasonal high water table at depth of 1 to 3 feet.	Unsuitable; none present.	Fair to poor; A-4, A-6.	Seasonal high water table at depth of 1 to 3 feet; high potential for frost action.	Seasonal high water table at depth of 1 to 3 feet; seepage in substratum.
Hagerstown: HaA, HaB2, HaC2.	Good to depth of 12 inches; coarse fragments in places.	Unsuitable; none present.	Fair to poor; A-4, A-6, A-7; moderate shrink-swell potential.	Bedrock at depth of 4 to 7 feet; moderate potential for frost action; cuts and fills needed; limestone boulders near surface.	Permeable materials; sinks, and solution channels.
Hatboro: Hb	Fair to depth of 9 inches; seasonal high water table at surface.	Unsuitable; fair below depth of 4½ feet in places.	Poor; A-4, A-6, A-7; locally underlain by stratified A-1, A-2 material.	Seasonal high water table at surface; high potential for frost action; flooding hazard.	Seasonal high water table at surface; flooding hazard; stratified and variable materials in substratum.
*Hollinger: HoB2, HoC2, HrD3, HsC. For interpretations of Conestoga soils in HrD3 and HsC, see Conestoga series.	Good	Unsuitable; too many fines.	Fair; A-4, A-5, A-6.	Bedrock at depth of 4 to 8 feet; moderate potential for frost action; cuts and fills needed.	Seepage losses; moderate to moderately rapid permeability.
Iuka: Iu	Good to depth of 10 inches.	Unsuitable; some local spots below depth of 3 feet.	Poor; A-4, A-6, A-7.	Seasonal high water table; high potential for frost action; flooding hazard.	Seasonal high water table; flooding hazard.
Joppa: JpB, JpC2, JpD2, JuD. Ratings for JuD are for Joppa series only.	Fair to poor; coarse materials.	Good; excessive fines locally.	Good; A-1, A-2, A-4.	Features are favorable; cuts and fills needed.	Excessive seepage.

of the soils—Continued

Soil features affecting—Continued						
Ponds—Continued Embankment	Drainage	Sprinkler irrigation	Terraces or diversions	Grassed waterways	Winter grading	Pipeline construction and maintenance
Fair stability; fair to good compaction; poor resistance to piping; porous sandy material.	Not needed; well drained.	Very high intake rate; rapid permeability; low moisture-holding capacity.	Fair stability; loose sand subject to soil blowing; low fertility; droughty.	Low moisture-holding capacity; low fertility.	Features generally favorable.	Trenches subject to caving.
Fair stability and compaction; fair to poor resistance to piping.	Not needed; well drained.	Moderate intake rate and permeability; high moisture-holding capacity.	Fair stability; erodible.	High moisture-holding capacity.	Fair trafficability.	Bedrock at depth of 4 to 10 feet.
Fair stability and fair to good compaction; fair resistance to piping.	Seasonal high water table at depth of 1 to 3 feet; moderately slow permeability.	Moderate intake rate; moderately slow permeability; seasonal high water table.	Not needed on this soil.	Moderate moisture-holding capacity; seasonal high water table.	Fair to poor trafficability; seasonal high water table.	Seasonal high water table at depth of 1 to 3 feet; bedrock at depth of 4 to 10 feet.
Fair to poor stability and compaction; fair resistance to piping.	Not needed; well drained.	Moderate intake rate and permeability; high moisture-holding capacity.	Fair to poor stability.	High moisture-holding capacity; moderate fertility.	Fair trafficability; sticky plastic material.	Limestone boulders near surface; plastic material.
Fair to poor stability; fair compaction; fair resistance to piping.	Seasonal high water table at surface; flooding hazard; outlets difficult to obtain.	Not needed on this soil.	Not needed on this soil.	Seasonal high water table at surface; flooding hazard.	Poor trafficability; seasonal high water table at surface; flooding hazard.	Seasonal high water table at surface; flooding hazard.
Fair to poor stability and compaction; poor resistance to piping.	Not needed; well drained.	Moderate intake rate; moderate to high moisture-holding capacity.	Fair to poor stability; highly erodible.	Moderate to high moisture-holding capacity and fertility.	Fair to good trafficability.	Bedrock at depth of 4 to 8 feet.
Fair to poor stability; fair compaction; fair resistance to piping.	Seasonal high water table; flooding hazard; outlets difficult to obtain.	Moderate intake rate and permeability; high moisture-holding capacity.	Not needed on this soil.	Seasonal high water table; flooding hazard.	Fair trafficability; seasonal high water table; flooding hazard.	Seasonal high water table; flooding hazard.
Good stability and good to fair compaction; fair to good resistance to piping.	Not needed; well drained.	High intake rate; rapid permeability; low moisture-holding capacity.	Good stability---	Low moisture-holding capacity.	Good trafficability.	Features generally favorable.

TABLE 6.—*Engineering interpretations*

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Roadfill	Highway and road location	Ponds: Reservoir area
Kelly: KeB2, KeC2, KsC, KuB. Ratings for KuB are for Kelly series only.	Fair to poor to depth of 6 to 8 inches; seasonal high water table at depth of 1 to 2 feet.	Unsuitable; none present.	Poor; A–6, A–7; high shrink-swell potential; very plastic clay material.	Seasonal high water table at depth of 1 to 2 feet; very plastic; moderate to high shrink-swell potential; clays; bedrock at depth of 3½ to 5 feet; moderate to high potential for frost action.	Seasonal high water table at depth of 1 to 2 feet; slow permeability; bedrock at depth of 3½ to 5 feet.
Legore: LeB2, LeC2, LeD2, LeE, LfC, LfD, LfE, LgC3, LgD3, LhB, LhC. Ratings for LhB and LhC are for Legore series only.	Fair to poor; variable gravel content.	Poor; excessive fines.	Fair to poor; A–4, A–6, A–7 underlain at depth of about 2 feet with A–2 or A–6 material; low to moderate shrink-swell potential.	Bedrock at depth of more than 4 feet; low to moderate potential for frost action; cuts and fills needed.	Moderate permeability; bedrock substratum; moderately rapid permeability; bedrock at depth of more than 4 feet.
Lenoir: LlB, LmB, LmC2, LnC3, LoB. Ratings for LoB are for Lenoir series only.	Fair to depth of 10 inches; plastic material below.	Unsuitable; clayey, plastic material.	Poor; A–6, A–7, A–4; moderate to high shrink-swell potential.	Seasonal high water table at depth of 1½ to 2½ feet; high potential for frost action; plastic material.	Seasonal high water table at depth of 1½ to 2½ feet; seepage slow in spots.
Leonardtown: Lr	Poor to fair; perched high water table at depth of 0 to 1 foot.	Unsuitable; silty materials.	Poor to fair; A–4, A–6, A–2.	Perched water table at depth of 0 to 1 foot; high potential for frost action; seepage in cuts	Perched water table at depth of 0 to 1 foot; seepage unlikely to a depth of 5 feet; slow to moderate below.
Lindside: Ls	Good; seasonal high water table at depth of 1½ to 3 feet.	Unsuitable; locally some sand under 4 foot overburden.	Poor to fair; A–4, A–6 material, stratified below depth of 4 feet in places; A–2, A 4, A–6.	Seasonal high water table at depth of 1½ to 3 feet; flooding hazard.	Seasonal high water table at depth of 1½ to 3 feet; flooding hazard; seepage in substratum.
Loamy and clayey land: LyB, LyD, LyE.	Fair above clay layer.	Unsuitable	Very poor; mostly A–7.	Cut slopes are unstable and are hard to vegetate; plastic materials.	Plastic; slowly permeable.

of the soils—Continued

Soil features affecting—Continued						
Ponds—Continued Embankment	Drainage	Sprinkler irrigation	Terraces or diversions	Grassed waterways	Winter grading	Pipeline construction and maintenance
Poor stability and compaction; moderate to high shrink-swell potential; good resistance to piping.	Slow permeability; plastic subsoil; seasonal high water table at depth of 1 to 2 feet.	Moderate intake rate; slow permeability.	Poor stability; very plastic clay material; erodible.	Seasonal high water table at depth of 1 to 2 feet; low fertility.	Poor trafficability; very plastic clays; moderate to high shrink-swell potential; seasonal high water table at depth of 1 to 2 feet.	Very plastic clays; seasonal high water table at depth of 1 to 2 feet; bedrock at depth of 3½ to 5 feet.
Fair to good stability and compaction; fair to poor resistance to piping.	Not needed; well drained.	Moderately rapid to moderately slow intake rate; variable gravel content; high moisture-holding capacity.	Fair to good stability; variable gravel content; erodible.	Erodible on moderate slopes.	Poor trafficability; variable gravel content.	Variable gravel content; bedrock at depth of more than 4 feet.
Fair to poor stability and compaction; medium to high compressibility; good resistance to piping; subject to cracking.	Seasonal high water table at depth of 1½ to 2½ feet; slow permeability.	Drainage needed; moderate to slow intake rate; slow permeability; high moisture-holding capacity.	Fair to poor stability; seepage in spots; plastic material; difficult to vegetate.	Plastic material; difficult to vegetate.	Poor trafficability; seasonal high water table at depth of 1½ to 2½ feet; plastic material.	Seasonal high water table at depth of 1½ to 2½ feet; plastic material; fair to poor stability; subject to seepage.
Poor to fair stability and compaction; fair resistance to piping.	Perched water table above fragipan; slow permeability.	Drainage needed; moderately slow intake rate; slow permeability; moderate moisture-holding capacity; fragipan limits rooting depth.	Perched water table at depth of 0 to 1 foot; seepage above fragipan; poor to fair stability.	Perched water table at depth of 0 to 1 foot; seepage above fragipan; highly erodible; low fertility.	Poor to very poor trafficability; perched water table at depth of 0 to 1 foot.	Perched water table at depth of 0 to 1 foot; seepage above fragipan; cuts unstable in places.
Fair to poor stability and compaction; fair to good resistance to piping.	Seasonal high water table at depth of 1½ to 3 feet; flooding hazard.	Moderate intake rate; moderate to moderately slow permeability; flooding hazard.	Not needed on this soil.	High moisture-holding capacity; seasonal high water table at depth of 1½ to 3 feet.	Poor trafficability; high silt content; seasonal high water table at depth of 1½ to 3 feet.	Seasonal high water table at depth of 1½ to 3 feet; flooding hazard.
Very poor stability; poor compaction; variable resistance to piping; highly erodible.	Not needed; well drained.	Variable intake rate; slow permeability; high moisture-holding capacity.	Very poor stability; plastic materials; difficult to vegetate.	Plastic materials; difficult to vegetate.	Poor trafficability; plastic materials.	Plastic materials; trenches will cave when wet.

TABLE 6.—*Engineering interpretations*

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Roadfill	Highway and road location	Ponds: Reservoir area
*Manor: MbB2, MbC2, MbC3, MbD2, MbD3, McB2, McC2, McC3, McD2, McD3, MdE, MeD, MgC, MhD, MhE. For interpretations of Glenelg soils in units MgC and Brandywine soils in units MhD and MhE, refer to the Glenelg and Brandywine series. Ratings for MeD are for Manor soils only.	Good	Unsuitable; excessive fine material.	Fair to poor; A–4, A–5; mica content increases with depth.	Substratum generally strongly weathered micaceous material; moderate potential for frost action; cuts and fills needed.	High seepage in permeable substratum.
Matapeake: MkA, MkB, MkC2.	Good	Unsuitable for gravel; fair to poor for sand below depth of 3 to 5 feet, unsuitable above.	Fair above depth of 3 to 5 feet; A–4, A–6; fair to good below depth of 3 to 5 feet; A–2, A–4, A–6.	Moderate potential for frost action; cuts and fills needed.	Moderate seepage above depth of 3 to 5 feet, rapid below.
Mattapex: MlA, MlB, MmB. Ratings for MmB are for Mattapex series only.	Good	Unsuitable for gravel, fair to poor for sand below depth of 3 to 5 feet; unsuitable above this depth.	Fair above depth of 3 to 5 feet; A–4, A–6; fair to good below; A–2, A–4, A–6.	Seasonal high water table at depth of 1½ to 2½ feet; high potential for frost action.	Seasonal high water table at depth of 1½ to 2½ feet; moderate to moderately slow seepage at depth of 3 to 5 feet; rapid seepage below.
Melvin: Mn, Mo	Fair; seasonal high water table at surface.	Unsuitable; too many fines.	Poor; A–4, A–6; low to moderate shrink-swell potential; locally stratified layers of sandy material below depth of 50 inches.	Seasonal high water table at surface; flooding hazard; high potential for frost action.	Seasonal high water table at surface; flooding hazard.
Montalto: MsB2, MsC2	Fair to depth of 10 inches.	Unsuitable; none present.	Poor to fair; A–6, A–7; moderate to high shrink-swell potential; sticky, plastic; stones.	Bedrock at depth of 5 to 12 feet; moderate potential for frost action; cuts and fills needed.	Bedrock at depth of 5 to 12 feet; seepage in substratum.
Mt. Airy: MtB2, MtC2, MtD2, MtD3.	Fair; variable coarse fragment content.	Unsuitable; too many fines; soft fragments.	Good; coarse fragment content increases with depth; limited quantity.	Bedrock at depth of 2 to 3 feet; low potential for frost action; cuts and fills needed.	Some seepage losses; moderate permeability.
Neshaminy: NeB2, NeC2	Good to depth of 14 inches; stones in places.	Unsuitable; none present.	Fair; A–2, A–4, A–6; low to moderate shrink-swell potential.	Bedrock at depth of 4 to 10 feet; moderate potential for frost action; cuts and fills needed.	Bedrock at depth of 4 to 10 feet; some seepage losses; moderate permeability.

of the soils—Continued

Soil features affecting—Continued						
Ponds—Continued Embankment	Drainage	Sprinkler irrigation	Terraces or diversions	Grassed waterways	Winter grading	Pipeline construction and maintenance
Fair to poor stability and compaction; poor resistance to piping.	Not needed; well drained.	Moderate intake rate; moderate moisture-holding capacity.	Fair to poor stability; erodible; stones.	Moderate moisture-holding capacity; erodible; stones.	Fair trafficability; substratum micaceous; stones.	All features favorable.
Fair stability, fair to good compaction; fair to poor resistance to piping.	Not needed; well drained.	Moderate intake rate; moderate permeability; high moisture-holding capacity.	Features generally favorable.	Features generally favorable.	Fair trafficability; some plastic material.	Features generally favorable.
Fair stability; fair to good compaction; fair to good resistance to piping.	Seasonal high water table at depth of 1½ to 2½ feet; moderately slow permeability.	Drainage needed; moderate intake rate; moderately slow permeability; high moisture-holding capacity.	Fair stability----	Seasonal high water table at depth of 1½ to 2½ feet.	Poor trafficability; seasonal high water table at depth of 1½ to 2½ feet.	Seasonal high water table at depth of 1½ to 2½ feet.
Fair to poor stability and compaction; good to poor resistance to piping.	Seasonal high water table at surface; moderate to moderately slow permeability; flooding hazard; limited outlets.	Drainage needed; moderately slow intake rate and permeability.	Not needed on this soil.	Seasonal high water table at surface; flooding hazard.	Poor trafficability; seasonal high water table at surface; flooding hazard.	Seasonal high water table at surface; flooding hazard.
Fair to poor stability and compaction; fair to good resistance to piping; stones.	Not needed; well drained.	Moderate intake rate; moderately slow permeability; high moisture-holding capacity.	Fair to poor stability; erodible; stones.	High moisture-holding capacity.	Poor trafficability; sticky, plastic; stones.	Bedrock at depth of 5 to 12 feet; sticky, plastic material; stones.
Fair to good stability and compaction; poor resistance to piping.	Somewhat excessively drained.	Moderate intake rate and permeability; moderate to low moisture-holding capacity; bedrock at depth of 2 to 3 feet.	Fair to good stability; coarse fragments.	Bedrock at depth of 2 to 3 feet; moderate to low moisture-holding capacity; coarse fragments.	Good trafficability; bedrock at depth of 2 to 3 feet; coarse fragments.	Bedrock at depth of 2 to 3 feet; variable amounts of coarse fragments.
Fair stability and compaction; fair resistance to piping; stones.	Not needed; well drained.	Moderate intake rate; moderate permeability.	Fair stability; stones.	High moisture-holding capacity; stones.	Fair trafficability; stones.	Bedrock at depth of 4 to 10 feet; stones.

TABLE 6.—*Engineering interpretations*

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Roadfill	Highway and road location	Ponds: Reservoir area
Othello: Ot	Fair; seasonal high water table at depth of 0 to 1 foot.	Fair for sand below depth of 3 feet; unsuitable for gravel.	Fair; A–4, A–6, A–2.	Seasonal high water table at depth of 0 to 1 foot; high potential for frost action; local ponding.	Seasonal high water table at depth of 0 to 1 foot; moderately slow seepage in subsoil; rapid seepage in substratum.
Pocomoke: Po	Fair to poor; high organic-matter content; seasonal high water table at surface.	Fair for sand below depth of 30 inches; unsuitable for gravel.	Good to fair; A–2, A–4, A–3.	Seasonal high water table at surface; high potential for frost action; thick organic surface layer; local ponding.	Seasonal high water table at surface; moderate seepage above depth of 30 inches, rapid below; thick organic surface layer.
Relay: ReC2, ReD2, RsD, RsE, RyD3.	Fair to poor	Poor; excessive fines.	Fair to poor; A–4, A–6, A–7; low to moderate shrink-swell potential.	Bedrock at depth of 4 to 7 feet; low to moderate potential for frost action; cuts and fills needed.	Moderate permeability; bedrock at depth of 4 to 7 feet.
*Sassafras: ShA, ShB, ShC2, ShC3, ShD2, SlA, SlB, SsC2, SnB, SsD3, SsE. For interpretations of Joppa soils in SsD3 and SsE, refer to Joppa series. Ratings for SnB are for Joppa series only.	Good	Fair for sand and locally fair for gravel below depth of 3 feet.	Good; A–2, A–4, A–1, A–6.	Features are favorable; cuts and fills needed.	Moderate seepage in subsoil; rapid seepage in substratum.
Sunnyside: SuB2	Good	Fair for sand and locally fair for gravel below depth of 3 feet.	Good; A–2, A–4, A–1, A–6.	Features are favorable; cuts and fills needed.	Moderate seepage in subsoil; rapid seepage in substratum.
Watchung: WaA, WaB, WcB	Fair to depth of 9 inches; seasonal high water table at depth of 0 to 1 foot.	Unsuitable; none present.	Poor; A–6, A–7, A–4; moderate shrink-swell potential.	Seasonal high water table at depth of 0 to 1 foot; bedrock at depth of 5 to 10 feet; high potential for frost action.	Seasonal high water table at depth of 0 to 1 foot; bedrock at depth of 5 to 10 feet.
Woodstown: WdA, WdB, WoA, WoB.	Good	Fair for sand: unsuitable for gravel.	Fair to good; A–2, A–4, A–6.	Seasonal high water table at depth of 1½ to 2½ feet; high potential for frost action.	Seasonal high water table at depth of 1½ to 2½ feet; moderate seepage in subsoil; rapid seepage in substratum.

of the soils—Continued

Soil features affecting—Continued						
Ponds—Continued Embankment	Drainage	Sprinkler irrigation	Terraces or diversions	Grassed waterways	Winter grading	Pipeline construction and maintenance
Fair stability; fair to good compaction; fair to poor resistance to piping.	Seasonal high water table at depth of 0 to 1 foot; moderately slow permeability.	Drainage needed; moderate intake rate; moderately slow permeability; high moisture-holding capacity; running sand substratum.	Not needed on this soil.	Seasonal high water table at depth of 0 to 1 foot.	Poor trafficability; seasonal high water table at depth of 0 to 1 foot.	Seasonal high water table at depth of 0 to 1 foot; running sand substratum; caving hazard.
Fair stability; fair to good compaction; poor resistance to piping; organic materials in surface layer.	Seasonal high water table at surface; moderate permeability; unstable ditchbanks.	Drainage needed; moderate intake rate; moderate permeability; high moisture-holding capacity.	Not needed on this soil.	Not needed on this soil.	Poor trafficability; seasonal high water table at surface.	Seasonal high water table at surface; trenches subject to caving.
Fair to good stability and compaction; fair to good resistance to piping.	Not needed; well drained.	Moderate to moderately rapid intake rate; variable gravel content; high moisture-holding capacity.	Fair to good stability; variable gravel content; erodible.	Erodible on moderate slopes.	Good trafficability.	Stones; bedrock at depth of 4 to 7 feet.
Good stability and compaction: fair to poor resistance to piping.	Not needed; well drained.	Moderate to moderately rapid intake rate; moderate permeability; moderate to high moisture-holding capacity.	Features generally favorable.	Features generally favorable.	Good trafficability.	Features generally favorable.
Good stability and compaction; fair to poor resistance to piping.	Not needed; well drained.	Moderate to moderately rapid intake rate; moderate permeability; moderate moisture-holding capacity.	Features generally favorable.	Features generally favorable.	Good trafficability.	Features generally favorable.
Fair to poor stability and compaction; good resistance to piping.	Seasonal high water table at depth of 0 to 1 foot; slow permeability.	Seasonal high water table at depth of 0 to 1 foot; slow permeability.	Not needed on this soil.	Seasonal high water table at depth of 0 to 1 foot.	Poor trafficability; plastic material seasonal high water table at depth of 0 to 1 foot.	Seasonal high water table at depth of 0 to 1 foot; bedrock at depth of 5 to 10 feet; plastic material.
Good stability and compaction; fair to poor resistance to piping.	Seasonal high water table at depth of 1½ to 2½ feet; moderate permeability; ditchbanks subject to caving.	Drainage needed; moderate to moderately rapid intake rate; moderate permeability; moderate to high moisture-holding capacity.	Features generally favorable.	Features generally favorable.	Fair trafficability; seasonal high water table at depth of 1½ to 2½ feet.	Seasonal high water table at depth of 1½ to 2½ feet; trenches subject to caving.

In the Unified system soils are classified according to particle size distribution, plasticity, liquid limit, and organic matter. Soils are grouped in 15 classes. There are eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, SP—SM.

The AASHO system is used to classify soils according to those properties that affect use in highway construction and maintenance. In this system, a soil is placed in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A-1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundation). At the other extreme, in group A-7, are clay soils that have low strength when wet and that are the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A-1, A-2, and A-7 groups are divided as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As additional refinement, the engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 or more for the poorest. The estimated AASHO classification, without group index numbers, is given in table 5 for all soils mapped in the county.

Estimated properties

Table 5 provides, for the soils of each series, estimates of soil properties that are significant in engineering. The estimates are based on field classification and descriptions, test data from comparable soils in adjacent areas, and from detailed experience in working with the individual kind of soil in the survey area. Miscellaneous land types that have variable characteristics are not listed. Depth to bedrock, where significant, and kind of bedrock are listed along with depth to seasonal high water table.

The thickness of each major horizon is given for all soil series and are as described in the section "Descriptions of the Soils." In table 5 the thickness of the surface layer applies only to soils that are slightly or moderately eroded. The surface layer of severely eroded soils is thinner or can be lacking, and the underlying horizons are closer to the surface than is indicated in the table.

USDA texture is determined by the relative proportions of sand, silt, and clay in soil material that is less than 2.0 millimeters in diameter. "Sand," "silt," "clay," and some of the other terms used in the USDA textural classification are defined in the Glossary of this publication.

Percentage passing sieve shows the estimated range in percentages, by weight, of soil particles that pass sieves of specified sizes. Sand and other coarser materials do not pass through the No. 200 sieve. Silt and clay pass through the No. 200 sieve. Silt is that material larger than 0.002 millimeter in diameter that passes through the No. 200 sieve, and clay is that fraction passing through the No. 200 sieve that is smaller than 0.002 millimeter in diameter. The clay fraction was determined by the hydrometer method, rather than the pipette method that most soil scientists use in determining the clay content of soil samples.

Permeability, as used in table 5, relates only to movement of water downward through undisturbed and uncompacted soil. It does not include lateral seepage. The estimates are based on structure and porosity of the soil. Plowpans, surface crusts, and other properties resulting from man's use of the soils are not considered. Ratings of permeability in inches per hour are *very slow* or *slow*, 0.63–2.0; *moderately rapid*, 2.0–6.3; and *rapid* or *very rapid*, more than 6.3.

Available water capacity (available moisture capacity) is the capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Reaction is the degree of acidity or alkalinity of a soil, expressed as a pH value.

Shrink-swell potential is an indication of the volume changes that can be expected of the soil material with changes in moisture content. Shrinking and swelling of soils cause much damage to building foundations, roads, and other structures. A high shrink-swell potential indicates hazards to the maintenance of structures constructed in, on, or with such materials. It is estimated primarily on the basis of the kind and amount of clay present in the soils.

Engineering interpretations

Table 6 contains selected information useful to engineers and others who plan to use soil material in construction of highways, farm facilities, buildings, and sewage disposal systems. Such detrimental or undesirable features as presence of bedrock (fig. 15) and its depth are emphasized, but important desirable features are also listed. The ratings and other interpretations in this table are based on estimated engineering properties of the soils in table 5, on available test data, and on field experience.

***Figure 15.*—Limestone had to be blasted out of this Hollinger soil before public utility lines could be installed.**

Although the information applies only to soil depths indicated in table 5, it is reasonably reliable to depths of about 6 feet for most soils.

Topsoil is a term used to designate a fertile soil or soil material, ordinarily rich in organic matter, used to topdress lawns, gardens, and roadbanks.

Sand and gravel ratings are based on the probability that delineated areas of the soil contain deposits of sand and gravel. The ratings do not indicate quality or size of the deposits.

Road fill is material used to build embankments. The ratings indicate performance of soil material moved from borrow areas for these purposes.

Highway and road location is influenced by features of the undisturbed soil that affect construction and maintenance of highways. The soil features, favorable as well as unfavorable, are the principal ones that affect geographic location of highways.

Pond reservoir areas are affected mainly by seepage loss of water, and the soil features are those that influence such seepage.

Pond embankments serve as dams. The soil features of both subsoil and substratum are those important to the use of soils for constructing embankments.

Drainage interpretations are determined by the ease or difficulty with which a soil can be drained. Soil features of importance in making this determination are permeability of the least permeable layer, height and fluctuation of the water table, and the erodibility of the bottoms and banks of ditches.

Sprinkler irrigation design is influenced by the rate water infiltrates the soil, the capacity of the soil to retain moisture, and the degree of natural drainage. Soils that impede drainage should be drained artificially before an irrigation system is used.

Terrace and diversion construction is affected by soil stability and erodibility. These features, as well as available water capacity and natural fertility of the surface soil, strongly influence the design of these structures in fields, and the kinds of grasses or other plants used to stabilize them.

Grassed waterway interpretations are determined by soil erodibility, available water capacity, natural fertility of the surface soil, seasonal fluctuations in water tables, and seepage from adjacent slopes.

Winter grading is affected chiefly by soil features, especially unfavorable ones, that are relevant to moving, mixing, and compacting soil in road building when temperatures are below freezing.

Pipeline construction and maintenance is influenced by the natural in-place stability of the soil, by height and seasonal fluctuation of the water table, and by the potential of the soil to corrode pipes.

Town and Country Planning

This section consists of two main parts. The first part discusses residential and related uses of the soils and provides a table that shows the degree and kind of limitation of each soil in the county for specified uses. The second part discusses the use of soils for several recreational activities and shows, in a table, the limitations of each soil for specified recreational uses.

Use of soils for town and country planning

Soils are an important consideration in the preparation of plans for towns and other subdivisions of government. Planners must take into account the location and extent of soils that have high water tables, impermeable layers, unstable material (fig. 16) and those that are shallow to bedrock or are subject to flooding. Public health officers need to know how soils affect the plans they make and the permits they approve. Information in this section can be an effective tool in making land-use decisions, selecting sites for particular uses, and for site development after selection.

Table 7 shows the limitations of the soils of Baltimore County for specific uses pertaining to town and country planning. In delineating areas for broad uses and in selecting individual sites for particular uses, the soil limitation rating given a soil, while important, is only one of the criteria considered. Population densities, existing road networks, land values, and sentiments of people to be affected are examples of other criteria. Often soil limitations can be modified or overcome so that a soil can be used safely for the intended urban use. With proper engineering design some kinds of soil having severe limitations for a particular use may be put to that use. This is especially important where good sites are scarce. However, as the severity of a soil limitation increases so does the cost of overcoming or modifying it. Annual maintenance costs of facilities on soil having limitations generally increase as the severity of the limitation increases.

Table 7, used with the detailed soil maps at the back of this publication, aids in planning decisions for such uses as septic tank filter fields, sewage lagoons, homesites, streets and parking lots, and home gardens. Each of these uses and the major soil properties that limit this use are discussed below. These limitations are rated *slight*, *moderate*, and *severe*. A rating of *slight* includes the range none to slight. The soil characteristic having the highest degree of limitation is used to rate the soil. *Slight* means soil properties generally favorable for the rated use or, in other words, limitations that are minor and easily overcome. *Moderate* means that some soil properties are unfavorable but can be overcome or modified by special planning and design. *Severe* means soil properties so unfavorable and so difficult to correct or overcome as to require major soil reclamation, special designs, or intensive maintenance.

Filter fields for disposal of effluent from septic tanks.—The most common on-site method of sewage disposal, used in areas where central sewage systems are unavailable, is the septic tank system. The well-designed system consists of a septic tank for holding solid wastes, a distribution box for dispensing effluent, and a tile disposal field. Successful operation of the entire system depends upon the ability of the soil to absorb and filter the liquid or effluent passed through the tile field. It is in the soil where effluent purification takes place. The presence of a soil characteristic which impairs proper absorption and filtering of the effluent (fig. 17) causes health hazards as well as public nuisance situations in smaller lots. Soil characteristics affecting the operation of the tile disposal field include permeability rates, depth to bedrock, depth to seasonal high water table, stoniness, flooding hazard, and steepness of slope.

Figure 16.—**Terraces and retaining walls help to stabilize the soil of this building site on Manor loam, 15 to 25 percent slopes, moderately eroded.**

Lagoons for stabilization of sewage.—A lagoon is a shallow lake used to hold sewage for the time required for decomposition by bacteria. A suitable site provides an impoundment area and enough soil material to build the dam structure. The completed lagoon must be able to hold water with minimum seepage and prevent contamination of water supplies. Other important factors to consider are location of occupied buildings, prevailing winds, inflow hazard from adjacent slopes, and the characteristics of receiving streams. Final selection of the specific location requires onsite investigation. Soil characteristics affecting sewage lagoons are permeability, slope, depth to bedrock, coarse fragments, stoniness, soil texture, flooding hazard, and organic-matter content.

Homesites, three stories or less.—The cost of excavation, the bearing strength of the foundation, and the drainage around the basement depend upon the soil. The properly constructed basement not only supports the building without undue settling and cracking, but stays dry throughout the year. Sound construction techniques provide adequate drainage around the foundation or footer to prevent undue settling and wet basements. Soil characteristics affecting building sites include depth to seasonal high water table, slope, depth to bedrock, stoniness, soil stability, and flooding hazard.

Streets and parking lots.—Soil properties influence the costs of construction and maintenance of streets and parking lots. A soil having a seasonal high water table (fig. 18) can delay construction work and can require drainage and expensive fill material in order to obtain a durable street or parking lot. Slope is a serious limitation because of the increased cut and fill requirements. Hard bedrock in places can substantially increase construction costs. Stoniness and flooding hazard are also important factors.

Figure 17.—**Pump being used to empty overloaded septic tank on Beltsville silt loam, 0 to 2 percent slopes. This soil has a fragipan at a depth of about 28 inches.**

Home gardens.—Soil characteristics that influence the plant growth of home gardens are depth to seasonal high water table, slope, depth to bedrock, stoniness, soil texture, and flooding hazard.

Use of soils for recreational development

The location of Baltimore County in the heavily populated metropolitan corridor and its own rapidly increasing population have placed a severe burden on existing recreational facilities. The need for well-planned, diverse recreation facilities is immediate as is the need for long range recreational planning. The soil survey is an effective tool for use in comprehensive recreational planning and site selection, as well as planning layouts of specific sites for various recreational uses.

Table 8 shows the kind and degree of limitation that the soils of Baltimore County have for specific recreational uses. In selecting a site for a particular recreational use, the soil limitation rating is only one of the criteria considered. Population densities, location, land values, are examples of other criteria. Some soil limitations can be modified or overcome so that a soil can be used safely for the intended recreational use. This is especially important where good sites are scarce, but as the severity of a soil limitation increases, so does the cost of overcoming, modifying, and maintaining them.

Table 8, used with the detailed soil maps at the back of this publication, aids in planning decisions for such uses as playgrounds, camp areas, picnic areas, paths, and trails. This table does not include soil interpretations for cottage, pavilion, or maintenance building foundations. For such information use the interpretations for homesites in table 7. Also, in table 7 the ratings of soils for onsite sewage effluent disposal will be of use where plans are being made for rest room and shower facilities requiring a septic tank. Each recreational use in table 8 and the major soil properties that limit this use are discussed in the paragraphs that follow. Three degrees of limitation are used: *slight*, *moderate*, and *severe*. The term *slight* includes the range none to slight. *Slight* means soil properties generally favorable for the rated use or, in other words, limitations that are minor and easily overcome. *Moderate* means that some soil properties are unfavorable but can be overcome or modified by special planning and design. *Severe* means soil properties so unfavorable and so difficult to correct or overcome as to require major soil reclamation, special design, or intensive maintenance.

Playgrounds.—Soils in this category are those that are to be used intensively for playgrounds for baseball, football, badminton, and other similar organized games. These areas are subject to intensive foot traffic. A nearly level surface, good drainage, and a soil texture and consistence that gives a firm surface generally are required. The most desirable soils are free of rock outcrops and coarse fragments. It is assumed that topsoil and fill material are not to be imported. Soil properties that affect the use of land for intensive play areas are wetness, flooding, permeability, slope, surface soil texture as it affects foot trafficability, surface wetness, dust and maintenance, depth to bedrock, coarse fragments on the surface, and stoniness and rockiness. Soil suitability for growing and maintaining vegetation has not been considered, but is an item to consider in evaluating areas for athletic fields and intensive play.

Camp areas.—Soils in this category are those that are to be used intensively for tents and small camp trailers and the accompanying activities of outdoor living. Sites have constant use during the camping season, involving heavy foot traffic by humans and limited vehicular traffic. It is assumed the sites are to accommodate large numbers of people camping from automobiles and that little site preparation is needed other than shaping and leveling. Soil properties that affect the use of a particular area for tent and trailer sites are wetness, flooding, permeability, slope, surface soil texture as it influences trafficability, dust, coarse fragments on the surface, and stoniness and rockiness. Soil suitability for growing and maintaining vegetation has not been considered, but is an item to consider in evaluating areas for campsites.

Picnic areas.—Soils in this category are those that are to be used as park picnic areas and areas for unorganized play. Picnic areas have permanent type tables, charcoal grills, trash receptacles, etc., and are subject to concentrated foot traffic. Vehicular traffic is confined to access roads. Extensive play areas are used for unorganized sports and sunbathing. Soil properties that influence use of land for picnic areas are wetness, flooding, slope, surface soil texture as it affects foot trafficability, dust, soil permeability, coarse fragments on the surface, and stoniness and rockiness. Soil suitability for growing and maintaining vegetation has not been considered, but is an item to consider in evaluating areas for picnicking and extensive play.

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TABLE 7.—*Limitations of soils for*

The land types Clay pits (Cp), Made land (Ma), Mine dumps and quarries (Mr), and Sand and gravel pits (Sg) are too variable for

Soil series and map symbols	Sewage disposal	
	Filter fields	Lagoons
Aldino:		
AdA	Severe: slow permeability; seasonally perched water table.	Slight
AdB2, AuB Ratings for AuB are for Aldino series only.	Severe: slow permeability; seasonally perched water table.	Moderate: slope
AdC2	Severe: slow permeability; slope; seasonally perched water table.	Severe: slope
AsC	Severe: slow permeability	Slight to severe: slope
Alluvial land: Av	Severe: high water table; flooding hazard.[1]	Severe: flooding hazard [1]
Baile:		
BaA	Severe: high water table; poor natural drainage; slow permeability.	Slight
BaB	Severe: high water table; poor natural drainage: slow permeability.	Moderate: slope
Baltimore:		
BmA	Slight	Moderate: moderate permeability.
BmB2, BnB Ratings for BnB are for Baltimore series only.	Slight	Moderate: moderate permeability; slope.
BmC2	Moderate: slope	Severe: slope
Barclay: Br	Severe: high water table; somewhat poor natural drainage.	Slight
Beltsville:		
BtA	Severe: slow permeability; seasonally perched water table.	Slight
BtB, BuB Ratings for BuB are for Beltsville series only.	Severe: slow permeability; seasonally perched water table.	Moderate: slope
BtC2, BuC Ratings for BuC are for Beltsville series only.	Severe: slow permeability; seasonally perched water table.	Severe: slope
Brandywine:		
BwB2	Slight [1]	Severe: rapid permeability [1]
BwC2	Moderate: slope [1]	Severe: rapid permeability; slope.[1]
ByD2, ByD3, ByE	Severe: slope [1]	Severe: rapid permeaiblity; slope.[1]
Captina:		
CaA	Severe: slow permeability; seasonally perched water table.	Slight
CaB2	Severe: slow permeability; seasonally perched water table.	Moderate: slope
Chester:		
CcA	Slight	Moderate: moderate permeability.
CcB2, CgB2	Slight	Moderate: moderate permeability; slope.
CcC2, CgC2	Moderate: slope	Severe: slope; moderate permeability.

See footnotes at end of table.

town and country planning

interpretation or are not used for the purpose listed. Urban land mapped in complex with several soil series is too variable for interpretation]

Homesites (3 stories or less)		Streets and parking lots	Home gardens
With basements	Without basements		
Moderate: seasonally perched water table.	Slight	Moderate: seasonally perched water table.	Moderate: seasonally perched water table.
Moderate: seasonally perched water table.	Slight	Moderate: seasonally perched water table; slope.	Moderate: slope; seasonally perched water table.
Moderate: seasonally perched water table; slope.	Moderate: slope	Severe: slope; seasonally perched water table.	Severe: slope; seasonally perched water table.
Moderate: seasonally perched water table; stoniness; slope.	Slight to moderate: slope	Moderate to severe: seasonally perched water table; stoniness; slope.	Severe: stoniness; slope; seasonally perched water table.
Severe: high water table; flooding hazard.	Severe: high water table; flooding hazard.	Severe: high water table; flooding hazard.	Severe: high water table; flooding hazard.
Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.
Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.
Slight	Slight	Slight	Slight.
Slight	Slight	Moderate: slope	Moderate: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Severe: high water table; somewhat poor natural drainage.	Severe: high water table; somewhat poor natural drainage.	Severe: high water table; somewhat poor natural drainage.	Severe: high water table; somewhat poor natural drainage.
Moderate: seasonally perched water table.	Slight	Moderate: seasonally perched water table.	Moderate: seasonally perched water table.
Moderate: seasonally perched water table.	Slight	Moderate: seasonally perched water table; slope.	Moderate: slope; seasonally perched water table.
Moderate: seasonally perched water table.	Slight	Severe: slope	Severe: slope.
Slight Moderate: slope	Slight Moderate: slope	Moderate: slope Severe: slope	Moderate: slope. Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: seasonally perched water table.	Slight	Moderate: seasonally perched water table.	Moderate: seasonally perched water table.
Moderate: seasonally perched water table.	Slight	Moderate: seasonally perched water table; slope.	Moderate: slope; seasonally perched water table.
Slight	Slight	Slight	Slight.
Slight	Slight	Moderate: slope	Moderate: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.

TABLE 7.—*Limitations of soils for town*

Soil series and map symbols	Sewage disposal	
	Filter fields	Lagoons
Chillum:		
ChB2, ClB—Ratings for ClB are for Chillum series only.	Slight to moderate: moderate permeability.	Moderate: moderate permeability; slope.
ChC2, ChC3	Slight to moderate: moderate permeability.	Severe: slope
ClD—Ratings for ClD are for Chillum series only.	Moderate: moderate permeability; slope.	Severe: slope
CkB2	Slight to moderate: moderate permeability.	Moderate: moderate permeability; slope.
CkC2	Slight to moderate: moderate permeability.	Severe: slope
CkD2	Moderate: moderate permeability; slope.	Severe: slope
Christiana:		
CmB	Severe: slow permeability	Moderate: slope
CmC2	Severe: slow permeability	Severe: slope
Chrome:		
CnB2	Severe: less than 3 feet to bedrock.	Severe: less than 3 feet to bedrock.
CoC3	Severe: less than 20 inches to bedrock.	Severe: less than 20 inches to bedrock; slope.
CoE3	Severe: less than 20 inches to bedrock; slope.	Severe: less than 20 inches to bedrock; slope.
Coastal beaches: Ct	Severe: tidal high water table; flooding.[1]	Severe: rapid permeability; tidal flooding.[1]
Codorus: Cu	Severe: moderately high water table; flooding hazard.[1]	Severe: flooding hazard [1]
Comus: Cv	Severe: flooding hazard [1]	Severe: flooding hazard [1]
Conestoga:		
CwB2	Slight	Moderate: moderate permeability; slope.
CwC2	Moderate: slope	Severe: slope
Delanco: DcB	Severe: moderately slow permeability; moderately high water table.	Moderate: slope
Dunning: Du	Severe: high water table; very poor natural drainage; slow permeability; flooding hazard.[1]	Severe: flooding hazard [1]
Edgemont:		
EdB2	Moderate: 3½ to 5 feet to bedrock.[1]	Severe: rapid permeability.[1]
EdC2	Moderate: 3½ to 5 feet to bedrock; slope.[1]	Severe: rapid permeability; slope.[1]
EgD, EgE	Severe: slope [1]	Severe: rapid permeability; slope.[1]
Elioak:		
EhB2, EkB2	Slight	Moderate: moderate permeability; slope.
EhC2, EkC2, ElC3	Moderate: slope	Severe: slope
Elkton: Em, En, Eo—Ratings for Eo are for Elkton series only.	Severe: high water table; poor natural drainage, slow permeability.	Slight

See footnotes at end of table.

and country planning—Continued

Homesites (3 stories or less)		Streets and parking lots	Home gardens
With basements	Without basements		
Slight	Slight	Moderate: slope	Moderate: slope.
Slight	Slight	Severe: slope	Severe: slope.
Slight to moderate: slope	Slight to moderate: slope	Severe: slope	Moderate to severe: slope.
Slight	Slight	Moderate: slope	Moderate: slope.
Slight	Slight	Severe: slope	Severe: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Severe: subsoil shrinkage and instability. Severe: subsoil shrinkage and instability.	Severe: subsoil shrinkage and instability. Severe: subsoil shrinkage and instability.	Severe: subsoil shrinkage and instability. Severe: subsoil shrinkage and instability; slope.	Moderate: slope. Severe: slope.
Moderate: less than 3 feet to rippable bedrock. Severe: less than 20 inches to rippable bedrock. Severe: less than 20 inches to rippable bedrock; slope.	Slight Moderate: less than 20 inches to rippable bedrock; slope. Severe: slope	Moderate: less than 3 feet to rippable bedrock; slope. Severe: less than 20 inches to rippable bedrock; slope. Severe: less than 20 inches to rippable bedrock; slope.	Moderate: slope; less than 3 feet to bedrock. Severe: slope; less than 20 inches to bedrock; severely eroded. Severe: slope; less than 20 inches to bedrock; severely eroded.
Severe: loose sand; tidal high water table; flooding.	Severe: loose sand; tidal high water table; flooding.	Severe: loose sand; tidal high water table; flooding.	Severe: salinity; extremely low fertility and moisture capacity.
Severe: flooding hazard	Severe: flooding hazard	Severe: flooding hazard	Moderate: moderately high water table; flooding hazard.
Severe: flooding hazard	Severe: flooding hazard	Severe: flooding hazard	Slight.[2]
Slight	Slight	Moderate: slope	Moderate: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Moderate: moderately high water table.	Slight	Moderate: moderately high water table; slope.	Moderate: slope; moderately high water table.
Severe: high water table; very poor natural drainage; flooding hazard.	Severe: high water table; very poor natural drainage; flooding hazard.	Severe: high water table; very poor natural drainage; flooding hazard.	Severe: high water table; very poor natural drainage; flooding hazard.
Moderate: 3½ to 5 feet to hard bedrock. Moderate: 3½ to 5 feet to hard bedrock; slope. Severe: slope; 3½ to 5 feet to hard bedrock.	Slight Moderate: slope Severe: slope	Moderate: 3½ to 5 feet to hard bedrock. Severe: slope Severe: slope	Moderate: slope. Severe: slope. Severe: slope; stoniness.
Slight	Slight	Moderate: slope	Moderate: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.

TABLE 7.—*Limitations of soils for town*

Soil series and map symbols	Sewage disposal	
	Filter fields	Lagoons
Elsinboro:		
EsB	Slight	Moderate: moderate permeability; slope.
EsC2	Moderate: slope	Severe: slope
Fallsington: Fa, Fs	Severe: high water table; poor natural drainage.	Moderate: moderate permeability.
Fort Mott: FtB	Slight [1]	Severe: rapid permeability [1]
Galestown:		
GaB	Slight [1]	Severe: rapid permeability [1]
GaC	Slight [1]	Severe: rapid permeability; slope.[1]
Glenelg:		
GcB2, GgB2, GlB Ratings for GlB are for Glenelg series only.	Slight	Moderate: moderate permeability; slope.
GcC2, GcC3, GgC2, GlC Ratings for GlC are for Glenelg series only.	Moderate: slope	Severe: slope
GcD2, GcD3, GgD2, GgD3	Severe: slope	Severe: slope
Glenville:		
GnA	Severe: high water table; moderately slow permeability.	Slight
GnB, GuB Ratings for GuB are for Glenville series only.	Severe: high water table; moderately slow permeability.	Moderate: slope
Hagerstown:		
HaA	Slight	Moderate: moderate permeability.
HaB2	Slight	Moderate: moderate permeability; slope.
HaC2	Moderate: slope	Severe: slope
Hatboro: Hb	Severe: high water table; flooding hazard.[1]	Severe: flooding hazard [1]
Hollinger:		
HoB2	Slight	Moderate: moderate permeability; slope.
HoC2	Moderate: slope	Severe: slope
HrD3	Severe: slope	Severe: slope
HsC	Severe: very rocky	Severe: very rocky
Iuka: Iu	Severe: moderately high water table; flooding hazard.[1]	Severe: flooding hazard [1]
Joppa:		
JpB	Slight [1]	Moderate to severe: moderate to rapid permeability; slope.[1]
JpC2	Slight [1]	Severe: rapid permeability in places; slope.[1]
JpD2	Moderate: slope [1]	Severe: rapid permeability in places; slope.[1]
JuD Ratings for JuD are for Joppa series only.	Slight to moderate: slope [1]	Severe: rapid permeability in places; slope.[1]
Kelly:		
KeB2, KuB Ratings for KuB are for Kelly series only.	Severe: high water table; somewhat poor natural drainage; slow permeability.	Moderate: slope
KeC2, KsC	Severe: high water table; somewhat poor natural drainage; slow permeability.	Severe: slope

See footnotes at end of table.

and country planning—Continued

Homesites (3 stories or less)		Streets and parking lots	Home gardens
With basements	Without basements		
Slight	Slight	Moderate: slope	Moderate: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.
Slight	Slight	Moderate: slope	Moderate: low moisture capacity.
Slight	Slight	Moderate: slope	Severe: low moisture capacity and fertility.
Slight	Slight	Severe: slope	Severe: low moisture capacity and fertility; slope.
Slight	Slight	Moderate: slope	Moderate: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: high water table	Moderate: high water table	Severe: high water table	Moderate: high water table.
Severe: high water table	Moderate: high water table	Severe: high water table	Moderate: high water table; slope.
Slight	Slight	Slight	Slight.
Slight	Slight	Moderate: slope	Moderate: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Severe: high water table; flooding hazard.	Severe: high water table; flooding hazard.	Severe: high water table; flooding hazard.	Severe: high water table; flooding hazard.
Slight	Slight	Moderate: slope	Moderate: slope.
Moderate: slope Severe: slope Severe: very rocky	Moderate: slope Severe: slope Moderate: very rocky; slope	Severe: slope Severe: slope Severe: very rocky; slope	Severe: slope. Severe: slope; erosion. Severe: very rocky; slope.
Severe: flooding hazard	Severe: flooding hazard	Severe: flooding hazard	Moderate: moderately high water table; flooding hazard.
Slight	Slight	Moderate: slope	Moderate: moderately low moisture capacity; gravel; slope.
Slight	Slight	Severe: slope	Severe: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Slight to moderate: slope	Slight to moderate: slope	Severe: slope	Severe: slope.
Severe: high water table; somewhat poor natural drainage; subsoil shrinkage and instability.	Severe: high water table; somewhat poor natural drainage; subsoil shrinkage and instability.	Severe: high water table; somewhat poor natural drainage; subsoil shrinkage and instability.	Severe: high water table; somewhat poor natural drainage.
Severe: high water table; somewhat poor natural drainage; subsoil shrinkage and instability.	Severe: high water table; somewhat poor natural drainage; subsoil shrinkage and instability.	Severe: high water table; somewhat poor natural drainage; subsoil shrinkage and instability; slope.	Severe: high water table; somewhat poor natural drainage; slope; stoniness in KsC.

TABLE 7.—*Limitations of soils for town*

Soil series and map symbols	Sewage disposal	
	Filter fields	Lagoons
Legore:		
LeB2, LhB—Ratings for LhB are for Legore series only.	Slight	Moderate: moderate permeability; slope.
LeC2, LgC3, LhC—Ratings for LhC are for Legore series only.	Moderate: slope	Severe: slope
LeD2, LeE, LfD, LfE, LgD3	Severe: slope	Severe: slope
LfC	Moderate: slope	Severe: slope
Lenoir:		
LlB, LmB, LoB—Ratings for LoB are for Lenoir series only.	Severe: high water table; somewhat poor natural drainage; slow permeability.	Slight to moderate: slope
LmC2, LnC3	Severe: high water table; somewhat poor natural drainage; slow permeability.	Severe: slope
Leonardtown: Lr	Severe: poor natural drainage; high water table; slow permeability.	Slight
Lindside: Ls	Severe: moderately high water table; moderate to moderately slow permeability; flooding hazard. [1]	Severe: flooding hazard [1]
Loamy and clayey land:		
LyB	Severe: slow permeability	Slight to moderate: slope
LyD	Severe: slow permeability	Severe: slope
LyE	Severe: slow permeability; slope.	Severe: slope
Manor:		
MbB2, McB2	Slight	Severe: rapid permeability
MbC2, MbC3, McC2, McC3	Moderate: slope	Severe: rapid permeability; slope.
MbD2, MbD3, McD2, McD3, MdE, MeD—Ratings for MeD are for Manor series only.	Severe: slope	Severe: rapid permeability; slope.
MgC	Slight to moderate: slope	Severe: rapid permeability in places; slope.
MhD, MhE	Severe: slope [1]	Severe: rapid permeability; slope. [1]
Matapeake:		
MkA	Slight to moderate: moderate permeability.	Slight to moderate: moderate permeability.
MkB	Slight to moderate: moderate permeability.	Moderate: moderate permeability; slope.
MkC2	Moderate: moderate permeability; slope.	Severe: slope
Mattapex:		
MlA	Severe: moderately slow permeability.	Slight
MlB, MmB—Ratings for MmB are for Mattapex series only.	Severe: moderately slow permeability.	Moderate: slope
Melvin:		
Mn	Severe: high water table; poor natural drainage; flooding hazard. [1]	Severe: flooding hazard [1]
Mo	Severe: high water table; poor natural drainage.	Slight to moderate: moderately slow to moderate permeability.
Montalto:		
MsB2	Severe: moderately slow permeability.	Moderate: slope
MsC2	Severe: moderately slow permeability.	Severe: slope

See footnotes at end of table.

and country planning—Continued

Homesites (3 stories or less)		Streets and parking lots	Home gardens
With basements	Without basements		
Slight	Slight	Moderate: slope	Moderate: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope; erosion in LgC3.
Severe: slope	Severe: slope	Severe: slope	Severe: slope; stoniness in LfD, LfE; erosion in LgD3.
Moderate: stoniness; slope	Slight to moderate: slope	Severe: slope	Severe: slope; stoniness.
Severe: high water table; somewhat poor natural drainage.	Severe: high water table; somewhat poor natural drainage.	Severe: high water table; somewhat poor natural drainage.	Severe: high water table; somewhat poor natural drainage.
Severe: high water table; somewhat poor natural drainage.	Severe: high water table; somewhat poor natural drainage.	Severe: high water table; somewhat poor natural drainage; slope.	Severe: high water table; somewhat poor natural drainage; slope; erosion in LnC3.
Severe: poor natural drainage; high water table.	Severe: poor natural drainage; high water table.	Severe: poor natural drainage; high water table.	Severe: poor natural drainage; high water table.
Severe: flooding hazard	Severe: flooding hazard	Severe: flooding hazard	Moderate: moderately high water table; flooding hazard.
Severe: subsoil shrinkage and instability.	Severe: subsoil shrinkage and instability.	Severe: subsoil shrinkage and instability.	Severe: low productivity.
Severe: subsoil shrinkage and instability.	Severe: subsoil shrinkage and instability.	Severe: subsoil shrinkage and instability; slope.	Severe: low productivity; slope.
Severe: subsoil shrinkage and instability; slope.	Severe: subsoil shrinkage and instability; slope.	Severe: subsoil shrinkage and instability; slope.	Severe: low productivity; slope.
Slight	Slight	Moderate: slope	Moderate: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope; erosion in MbC3, McC3.
Severe: slope	Severe: slope	Severe: slope	Severe: slope; erosion in MbD3 McD3.
Moderate: stoniness; slope	Slight to moderate: slope	Severe: slope	Severe: slope; stoniness.
Severe: slope	Severe: slope	Severe: slope	Severe: slope; stoniness.
Slight	Slight	Slight	Slight.
Slight	Slight	Moderate: slope	Moderate: slope.
Slight	Slight	Severe: slope	Severe: slope.
Moderate: moderately high water table.	Slight	Moderate: moderately high water table.	Moderate: moderately high water table.
Moderate: moderately high water table.	Slight	Moderate: moderately high water table; slope.	Moderate: slope; moderately high water table.
Severe: high water table; poor natural drainage; flooding hazard.	Severe: high water table; poor natural drainage; flooding hazard.	Severe: high water table; poor natural drainage; flooding hazard.	Severe: high water table; poor natural drainage; flooding hazard.
Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage	Severe: high water table; poor natural drainage.
Slight	Slight	Moderate: slope	Moderate: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.

TABLE 7.—*Limitations of soils for town*

Soil series and map symbols	Sewage disposal	
	Filter fields	Lagoons
Mt. Airy:		
MtB2	Severe: less than 3 feet to bedrock.	Severe: less than 3 feet to bedrock.
MtC2	Severe: less than 3 feet to bedrock.	Severe: less than 3 feet to bedrock; slope.
MtD2, MtD3	Severe: less than 3 feet to bedrock; slope.	Severe: less than 3 feet to bedrock; slope.
Neshaminy:		
NeB2	Moderate: moderate permeability.	Moderate: moderate permeability; slope.
NeC2	Moderate: slope; moderate permeability.	Severe: slope; moderate permeability.
Othello: Ot	Severe: high water table; poor natural drainage; moderately slow permeability.	Slight
Pocomoke: Po	Severe: high water table; very poor natural drainage.	Moderate: moderate permeability.
Relay:		
ReC2	Moderate: slope	Severe: slope
ReD2, RsE, RyD3	Severe: slope	Severe: slope
RsD	Slight to severe: slope	Moderate to severe: moderate permeability; slope.
Sassafras:		
ShA, SlA	Slight	Moderate: moderate permeability.
ShB, SlB, SnB	Slight	Moderate: moderate permeability; slope.
Ratings for SnB are for Sassafras series only.		
ShC2, ShC3, SlC2	Slight	Severe: slope
ShD2	Moderate: slope	Severe: slope
SsD3	Moderate: slope	Severe: slope
SsE	Severe: slope	Severe: slope
Stony land, steep: St	Severe: slope; excessive stoniness.	Severe: slope; excessive stoniness.
Sunnyside: SuB2	Slight	Moderate: moderate permeability; slope.
Swamp: Sw	Severe: ponded [1]	Severe: ponded [1]
Tidal marsh: Tm	Severe: tidal high water table.[1]	Severe: tidal high water table; instability.
Watchung:		
WaA	Severe: high water table; poor natural drainage; slow permeability.	Slight
WaB	Severe: high water table; poor natural drainage; slow permeability.	Moderate: slope
WcB	Severe: high water table; poor natural drainage; slow permeability.	Slight to moderate: slope
Woodstown:		
WdA, WoA	Moderate: moderately high water table.	Moderate: moderate permeability.
WdB, WoB	Moderate: moderately high water table.	Moderate: moderate permeability; slope.

[1] Strong possibility of polluting nearby springs, wells, ponds, streams, or other surface or underground water sources.

and country planning—Continued

Homesites (3 stories or less)		Streets and parking lots	Home gardens
With basements	Without basements		
Moderate: less than 3 feet to rippable bedrock.	Slight	Moderate: less than 3 feet to rippable bedrock; slope.	Severe: coarse fragments; high erodibility.
Moderate: less than 3 feet to rippable bedrock; slope.	Moderate: slope	Severe: slope	Severe: coarse fragments; high erodibility; slope.
Severe: slope; less than 3 feet to rippable bedrock.	Severe: slope	Severe: slope	Severe: coarse fragments; high erodibility; slope; erosion in MtD3.
Slight	Slight	Moderate: slope	Moderate: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.
Severe: high water table; very poor natural drainage.	Severe: high water table; very poor natural drainage.	Severe: high water table; very poor natural drainage.	Severe: high water table; very poor natural drainage.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope; erosion in RyD3; stoniness in RsE.
Moderate to severe: stoniness; slope.	Slight to severe: slope	Moderate to severe: stoniness; slope.	Severe: stoniness; slope.
Slight	Slight	Slight	Slight.
Slight	Slight	Moderate: slope	Moderate: slope.
Slight	Slight	Severe: slope	Severe: slope; erosion in ShC3.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope; erosion.
Severe: slope	Severe: slope	Severe: slope	Severe: slope; erosion.
Severe: slope; excessive stoniness.	Severe: slope; excessive stoniness.	Severe: slope; excessive stoniness.	Severe: slope; excessive stoniness.
Slight	Slight	Moderate: slope	Moderate: slope.
Severe: ponded	Severe: ponded	Severe: ponded	Severe: ponded.
Severe: tidal high water table; instability.	Severe: tidal high water table; instability.	Severe: tidal high water table; instability.	Severe: tidal high water table; salinity.
Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.
Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.
Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage.	Severe: high water table; poor natural drainage; stoniness.
Moderate: moderately high water table.	Slight	Moderate: moderately high water table.	Moderate: moderately high water table.
Moderate: moderately high water table.	Slight	Moderate: moderately high water table; slope.	Moderate: slope; moderately high water table.

[2] Where protected from flooding; otherwise severe.

Figure 18.—**Slumping of this bank on Beltsville silt loam was caused by lateral seepage from perched water table.**

TABLE 8.—*Estimated degree and kind of limitation for specified recreational uses*

The land types Clay pits (Cp), Made land (Ma), Mine dumps and quarries (Mr), and Sand and gravel pits (Sg) are not rated because they are highly variable or not used for the purposes listed]

Soil series and map symbols	Playgrounds	Camp areas	Picnic areas	Paths and trails
Aldino:				
AdA	Moderate: seasonally perched water table; slow permeability.	Moderate: seasonally perched water table; slow permeability.	Moderate: seasonally perched water tabl.	Slight.
AdB2, AuB Ratings for AuB are for Aldino series only.	Moderate: seasonally perched water table; slow permeability; slope.	Moderate: seasonally perched water table; slow permeability.	Moderate: seasonally perched water table.	Slight.

See footnote at end of table.

TABLE 8.—*Estimated degree and kind of limitation for specified recreational uses*—Continued

Soil series and map symbols	Playgrounds	Camp areas	Picnic areas	Paths and trails
Aldino—Continued				
AdC2	Severe: slope; seasonally perched water table; slow permeability.	Moderate: seasonally perched water table; slow permeability; slope.	Moderate: seasonally perched water table; slope.	Slight.
AsC	Moderate to severe: seasonally perched water table; slow permeability; stoniness; slope.	Moderate: seasonally perched water table; slow permeability; stoniness; slope.	Moderate: seasonally perched water table; slope.	Moderate: stoniness.
Alluvial land: Av	Severe: mostly poor natural drainage; flooding hazard.	Severe: mostly poor natural drainage; flooding hazard.	Severe: mostly poor natural drainage; flooding hazard.	Severe: mostly poor natural drainage; flooding hazard.
Baile: BaA, BaB	Severe: poor natural drainage; high water table; slow permeability.	Severe: poor natural drainage; high water table; slow permeability.	Severe: poor natural drainage; high water table.	Severe: poor natural drainage; high water table.
Baltimore:				
BmA	Slight	Slight	Slight	Slight.
BmB2, BnB Ratings for BnB are for Baltimore series only.	Moderate: slope	Slight	Slight	Slight.
BmC2	Severe: slope	Moderate: slope	Moderate: slope	Slight.
Barclay: Br	Severe: somewhat poor natural drainage; high water table.	Severe: somewhat poor natural drainage; high water table.	Severe: high water table.	Severe: high water table.
*Beltsville:				
BtA	Moderate: seasonally perched water table; slow permeability.[1]	Moderate: seasonally perched water table; slow permeability.[1]	Moderate: seasonally perched water table.	Slight.
BtB, BuB Ratings for BuB are for Beltsville series only.	Moderate: seasonally perched water table; slow permeability [1]; slope.	Moderate: seasonally perched water table; slow permeability.[1]	Moderate: seasonally perched water table.	Slight.
BtC2, BuC Ratings for BuC are for Beltsville series only.	Severe: slope; seasonally perched water table; slow permeability.	Moderate: seasonally perched water table; slow permeability.[1]	Moderate: seasonally perched water table.	Slight.
Brandywine:				
BwB2	Moderate: coarse fragments on surface; slope.	Slight	Slight	Slight.
BwC2	Severe: slope; coarse fragments on surface.	Moderate: slope	Moderate: slope	Slight.
ByD2, ByD3	Severe: coarse fragments on surface; slope.	Severe: slope	Severe: slope	Moderate: coarse fragments on surface; slope.
ByE	Severe: coarse fragments on surface; slope.	Severe: slope	Severe: slope	Severe: slope.
Captina:				
CaA	Moderate: seasonally perched water table; slow permeability.[1]	Moderate: seasonally perched water table; slow permeability.[1]	Moderate: seasonally perched water table.	Slight.
CaB2	Moderate: seasonally perched water table; slow permeability [1]; slope.	Moderate: seasonally perched water table; slow permeability.[1]	Moderate: seasonally perched water table.	Slight.
Chester:				
CcA	Slight	Slight	Slight	Slight.
CcB2	Moderate: slope	Slight	Slight	Slight.
CcC2, CgC2	Severe: slope	Moderate: slope	Moderate: slope	Slight.
CgB2	Moderate: coarse fragments on surface; slope.	Slight	Slight	Slight.

See footnote at end of table.

TABLE 8.—*Estimated degree and kind of limitation for specified recreational uses*—Continued

Soil series and map symbols	Playgrounds	Camp areas	Picnic areas	Paths and trails
Chillum:				
ChB2, ClB—Ratings for ClB are for Chillum series only.	Moderate: slope	Slight	Slight	Slight.
ChC2, ChC3	Severe: slope	Slight to moderate: moderate to moderately slow permeability.	Slight	Slight.
CkB2	Moderate: slope	Slight	Slight	Slight.
CkC2	Severe: slope	Slight	Slight	Slight.
CkD2	Severe: slope	Moderate: slope	Moderate: slope	Slight.
ClD—Ratings for ClD are for Chillum series only.	Severe: slope	Slight to moderate: moderate to moderately slow permeability; slope.	Slight to moderate: slope.	Slight.
Christiana:				
CmB	Moderate: slow permeability; [1] slope; clayey sticky subsoil.	Moderate: slow permeability.[1]	Slight	Slight.
CmC2	Severe: slope; slow permeability; clayey sticky subsoil.	Moderate: slow permeability.[1]	Slight	Slight.
Chrome:				
CnB2	Moderate: 20 to 40 inches to bedrock; slope.	Slight	Slight	Slight.
CoC3	Severe: less than 20 inches to bedrock; slope; sticky surface.	Moderate: sticky surface; slope.	Moderate: sticky surface; slope.	Moderate: sticky surface.
CoE3	Severe: less than 20 inches to bedrock; slope; sticky surface.	Severe: slope; sticky surface.	Severe: slope; sticky surface.	Moderate to severe: sticky surface; slope.
Coastal beaches: Ct	Severe: loose sand; subject to blowing.	Severe: loose sand; subject to blowing.	Severe: loose sand; subject to blowing.	Severe: loose sand.
Codorus: Cu	Moderate: moderately high water table; flooding hazard.	Severe: flooding hazard.	Moderate: moderately high water table; flooding hazard.	Moderate: flooding hazard.
Comus: Cv	Moderate: flooding hazard.	Severe: flooding hazard.	Moderate: flooding hazard.	Moderate: flooding hazard.
Conestoga:				
CwB2	Moderate: slope	Slight	Slight	Slight.
CwC2	Severe: slope	Moderate: slope	Moderate: slope	Slight.
Delanco: DcB	Moderate: moderately high water table; moderately slow permeability; slope.	Moderate: moderately high water table; moderately slow permeability.	Moderate: moderately high water table.	Slight.
Dunning: Du	Severe: very poor natural drainage; high water table; slow permeability; flooding hazard.	Severe: very poor natural drainage; high water table; slow permeability; flooding hazard.	Severe: very poor natural drainage; high water table; flooding hazard.	Severe: very poor natural drainage; high water table; flooding hazard.
Edgemont:				
EdB2	Moderate: coarse fragments on surface; slope.	Slight	Slight	Slight.
EdC2	Severe: slope; coarse fragments on surface.	Moderate: slope	Moderate: slope	Slight.
EgD	Severe: slope; coarse fragments on surface.	Moderate to severe: stoniness; slope.	Moderate to severe: slope.	Slight to moderate: slope.
EgE	Severe: slope; coarse fragments on surface.	Severe: slope	Severe: slope	Severe: slope.

See footnote at end of table.

TABLE 8.—*Estimated degree and kind of limitation for specified recreational uses*—Continued

Soil series and map symbols	Playgrounds	Camp areas	Picnic areas	Paths and trails
Elioak:				
EhB2	Moderate: slope	Slight	Slight	Slight.
EhC2, EkC2	Severe: slope	Moderate: slope	Moderate: slope	Slight.
EkB2	Moderate: coarse fragments on surface; slope.	Slight	Slight	Slight.
ElC3	Severe: slope	Moderate: sticky surface; slope.	Moderate: sticky surface; slope.	Moderate: sticky surface.
Elkton: Em, En, Eo. Ratings for Eo are for Elkton series only.	Severe: poor natural drainage; high water table; slow permeability.	Severe: poor natural drainage; high water table; slow permeability.	Severe: poor natural drainage; high water table.	Severe: poor natural drainage; high water table.
Elsinboro:				
EsB	Moderate: slope	Slight	Slight	Slight.
EsC2	Severe: slope	Moderate: slope	Moderate: slope	Slight.
Fallsington: Fa, Fs	Severe: poor natural drainage; high water table.	Severe: poor natural drainage; high water table.	Severe: poor natural drainage; high water table.	Severe: poor natural drainage; high water table.
Fort Mott: FtB	Moderate: loamy sand surface layer; slope.	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer.
Galestown:				
GaB	Severe: loamy sand subject to blowing.	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer.
GaC	Severe: loamy sand subject to blowing; slope.	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer.
Glenelg:				
GcB2, GlB. Ratings for GlB are for Glenelg series only.	Moderate: slope	Slight	Slight	Slight.
GcC2, GcC3, GgC2, GlC. Ratings for GlC are for Glenelg series only.	Severe: slope	Moderate: slope	Moderate: slope	Slight.
GcD2, GcD3, GgD2, GgD3	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
GgB2	Moderate: coarse fragments on surface; slope.	Slight	Slight	Slight.
Glenville:				
GnA	Moderate: moderately high water table; moderately slow permeability.	Moderate: moderately high water table; moderately slow permeability.	Moderate: moderately high water table.	Slight to moderate moderately good to somewhat poor natural drainage.
GnB, GuB. Ratings for GuB are for Glenville series only.	Moderate: moderately high water table; moderately slow permeability.	Moderate: moderately high water table; moderately slow permeability.	Moderate: moderately high water table.	Slight to moderate: moderately good to somewhat poor natural drainage.
Hagerstown:				
HaA	Slight	Slight	Slight	Slight.
HaB2	Moderate: slope	Slight	Slight	Slight.
HaC2	Severe: slope	Moderate: slope	Moderate: slope	Slight.
Hatboro: Hb	Severe: poor natural drainage; high water table; flooding hazard.	Severe: poor natural drainage; high water table; flooding hazard.	Severe: poor natural drainage; high water table; flooding hazard.	Severe: poor natural drainage; high water table; flooding hazard.

See footnote at end of table.

TABLE 8.—*Estimated degree and kind of limitation for specified recreational uses*—Continued

Soil series and map symbols	Playgrounds	Camp areas	Picnic areas	Paths and trails
Hollinger:				
HoB2	Moderate: slope	Slight	Slight	Slight.
HoC2	Severe: slope	Moderate: slope	Moderate: slope	Slight.
HrD3	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
HsC	Severe: rockiness; slope.	Moderate: rockiness; slope.	Moderate: rockiness; slope.	Moderate: rockiness.
Iuka: Iu	Moderate: moderately high water table; flooding hazard.	Severe: flooding hazard	Moderate: moderately high water table; flooding hazard.	Moderate: flooding hazard.
Joppa:				
JpB	Severe: coarse fragments on surface.	Moderate: coarse fragments on surface.	Moderate: coarse fragments on surface.	Moderate: coarse fragments on surface.
JpC2	Severe: coarse fragments on surface; slope.	Moderate: coarse fragments on surface.	Moderate: coarse fragments on surface.	Moderate: coarse fragments on surface.
JpD2, JuD. Ratings for JuD are for Joppa series only.	Severe: coarse fragments on surface; slope.	Moderate: coarse fragments on surface; slope.	Moderate: coarse fragments on surface; slope.	Moderate: coarse fragments on surface.
Kelly:				
KeB2, KuB. Ratings for KuB are for Kelly series only.	Severe: somewhat poor natural drainage; very slow permeability.	Severe: somewhat poor natural drainage; very slow permeability.	Moderate: somewhat poor natural drainage; moderately high water table.	Moderate: somewhat poor natural drainage; moderately high water table.
KeC2, KsC	Severe: somewhat poor natural drainage; very slow permeability; slope.	Severe: somewhat poor natural drainage; very slow permeability.	Moderate: somewhat poor natural drainage; moderately high water table; slope.	Moderate: somewhat poor natural drainage; moderately high water table.
Legore:				
LeB2, LhB. Ratings for LhB are for Legore series only.	Moderate: slope	Slight	Slight	Slight.
LeC2, LhC. Ratings for LhC are for Legore series only.	Severe: slope	Moderate: slope	Moderate: slope	Slight.
LeD2	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
LeE, LfE	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
LfC	Severe: slope	Moderate: stoniness; slope.	Moderate: slope	Moderate: stoniness.
LfD	Severe: slope	Severe: slope	Severe: slope	Moderate: stoniness; slope.
LgC3	Severe: slope	Moderate: sticky surface; slope.	Moderate: sticky surface; slope.	Moderate: sticky surface.
LgD3	Severe: slope	Severe: slope	Severe: slope	Moderate: sticky surface; slope.
Lenoir:				
LlB, LmB, LoB. Ratings for LoB are for Lenoir series only.	Severe: somewhat poor natural drainage; slow permeability.	Severe: somewhat poor natural drainage; slow permeability.	Moderate: somewhat poor natural drainage; moderately high water table.	Moderate: somewhat poor natural drainage; moderately high water table.
LmC2	Severe: somewhat poor natural drainage; slow permeability; slope.	Severe: somewhat poor natural drainage; slow permeability.	Moderate: somewhat poor natural drainage; moderately high water table.	Moderate: somewhat poor natural drainage; moderately high water table.
LnC3	Severe: somewhat poor natural drainage; slow permeability; slope.	Severe: somewhat poor natural drainge; slow permeability.	Moderate: somewhat poor natural drainage; moderately high water table; sticky surface.	Moderate: somewhat poor natural drainage; moderately high water table; sticky surface.

See footnote at end of table.

TABLE 8.—*Estimated degree and kind of limitation for specified recreational uses*—Continued

Soil series and map symbols	Playgrounds	Camp areas	Picnic areas	Paths and trails
Leonardtown: Lr	Severe: poor natural drainage; high water table; slow permeability.	Severe: poor natural drainage; high water table; slow permeability.	Severe: poor natural drainage; high water table.	Severe: poor natural drainage; high water table.
Lindside: Ls	Moderate: moderately high water table; moderate to moderately slow permeability; flooding hazard.	Severe: flooding hazard.	Moderate: moderately high water table; flooding hazard.	Moderate: flooding hazard.
Loamy and clayey land:				
LyB	Moderate: slow permeability [1]; slope.	Moderate: slow permeability.[1]	Slight	Slight.
LyD	Severe: slope	Moderate: slow permeability [1]; slope.	Slight to moderate: slope.	Slight.
LyE	Severe: slope	Severe: slope	Severe: slope	Moderate to severe: slope.
Manor:				
MbB2	Moderate: slope	Slight	Slight	Slight.
MbC2, MbC3, McC2, McC3	Severe: slope	Moderate: slope	Moderate: slope	Slight.
MbD2, MbD3, McD2, McD3, MeD. Ratings for MeD are for Manor series only.	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
McB2	Moderate: coarse fragments on surface; slope.	Slight	Slight	Slight.
MdE	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
MgC	Moderate to severe: stoniness; slope.	Moderate: stoniness; slope.	Slight to moderate: slope.	Moderate: stoniness.
MhD	Severe: slope	Severe: slope	Severe: slope	Moderate: stoniness; slope.
MhE	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Matapeake:				
MkA	Slight	Slight	Slight	Slight.
MkB	Moderate: slope	Slight	Slight	Slight.
MkC2	Severe: slope	Slight to moderate: moderate to moderately slow permeability; slope.	Slight to moderate: slope.	Slight.
Mattapex:				
MlA	Moderate: moderately high water table; moderately slow permeability.	Moderate: moderately high water table; moderately slow permeability.	Moderate: moderately high water table.	Slight.
MlB, MmB Ratings for MmB are for Mattapex series only.	Moderate: moderately high water table; moderately slow permeability; slope.	Moderate: moderately high water table; moderately slow permeability.	Moderate: moderately high water table.	Slight.
Melvin:				
Mn	Severe: poor natural drainage; high water table; flooding hazard	Severe: poor natural drainage; high water table; flooding hazard.	Severe: poor natural high water drainage table; flooding hazard.	Severe: poor natural drainage; high water table; flooding hazard.
Mo	Severe: poor natural drainage; high water table.	Severe: poor natural drainage; high water table.	Severe: poor natural drainage; high water table.	Severe: poor natural drainage; high water table.
Montalto:				
MsB2	Moderate: moderately slow permeability; slope.	Moderate: moderately slow permeability.	Slight	Slight.
MsC2	Severe: slope	Moderate: moderately slow permeability; slope.	Moderate: slope	Slight.

See footnotes at end of table.

TABLE 8.—*Estimated degree and kind of limitation for specified recreational uses*—Continued

Soil series and map symbols	Playgrounds	Camp areas	Picnic areas	Paths and trails
Mt. Airy:				
MtB2	Severe: coarse fragments on surface.	Moderate: coarse fragments on surface.	Moderate: coarse fragments on surface.	Moderate: coarse fragments on surface.
MtC2	Severe: coarse fragments on surface; slope.	Moderate: coarse fragments on surface; slope.	Moderate: coarse fragments on surface; slope.	Moderate: coarse fragments on surface.
MtD2, MtD3	Severe: coarse fragments on surface; slope.	Severe: slope	Severe: slope	Moderate: coarse fragments on surface; slope.
Neshaminy:				
NeB2	Moderate: slope	Slight	Slight	Slight.
NeC2	Severe: slope	Moderate: slope	Moderate: slope	Slight.
Othello: Ot	Severe: poor natural drainage; high water table.	Severe: poor natural drainage; high water table.	Severe: poor natural drainage; high water table.	Severe: poor natural drainage, high water table.
Pocomoke: Po	Severe: very poor natural drainage; high water table.	Severe: very poor natural drainage; high water table.	Severe: very poor natural drainage; high water table.	Severe: very poor natural drainage; high water table.
Relay:				
ReC2	Severe: slope	Moderate: slope	Moderate: slope	Slight.
ReD2	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
RsD	Moderate to severe: stoniness; slope.	Moderate to severe: stoniness; slope.	Slight to severe: slope	Moderate: stoniness; slope.
RsE	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
RyD3	Severe: slope	Severe: slope	Severe: slope	Moderate: sticky surface; slope.
Sassafras:				
ShA, SlA	Slight	Slight	Slight	Slight.
ShB, SlB, SnB	Moderate: slope	Slight	Slight	Slight.
Ratings for SnB are for Sassafras series only.				
ShC2, ShC3, SlC2	Severe: slope	Slight	Slight	Slight.
ShD2	Severe: slope	Moderate: slope	Moderate: slope	Slight.
SsD3	Severe: slope; coarse fragments on surface of Joppa.	Moderate: slope; coarse fragments on surface of Joppa.	Moderate: slope; coarse fragments on surface of Joppa.	Slight and moderate: coarse fragments on surface of Joppa.
SsE	Severe: slope; coarse fragments on surface of Joppa.	Severe: slope	Severe: slope	Moderate to severe: coarse fragments on surface of Joppa; slope.
Stony land, steep: St	Severe: extreme stoniness; slope.	Severe: extreme stoniness; slope.	Severe: extreme stoniness; slope.	Severe: extreme stoniness; slope.
Sunnyside: SuB2	Moderate: slope	Slight	Slight	Slight.
Swamp: Sw	Severe: ponded for long periods.	Severe: ponded for long periods.	Severe: ponded for long periods.	Severe: ponded for long periods.
Tidal marsh: Tm	Severe: tidal high water table; no trafficability.	Severe: tidal high water table; no trafficability.	Severe: tidal high water table; no trafficability.	Severe: tidal high water table; no trafficability.
Watchung: WaA, WaB, WcB.	Severe: poor natural drainage; high water table; slow permeability.	Severe: poor natural drainage; high water table; slow permeability.	Severe: poor natural drainage; high water table.	Severe: poor natural drainage; high water table.

See footnote at end of table.

TABLE 8.—*Estimated degree and kind of limitation for specified recreational uses*—Continued

Soil series and map symbols	Playgrounds	Camp areas	Picnic areas	Paths and trails
Woodstown:				
WdA, WoA	Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: moderately high water table.	Slight.
WdB, WoB	Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: moderately high water table.	Slight.

[1] These soils are slowly permeable, but they generally are dry for long periods during the seasons of most use, so they are rated as no more than moderately limited because of permeability.

Paths and trails.—Soils in this category are those that are to be used mainly for foot traffic, though some can be used for riding and cycling. The ratings are for hiking, nature study, or scenery. Soil features that affect foot traffic for paths and trails are natural drainage, water table level, looseness or stickiness of the soil surface, hazard of flooding, slope, stoniness, rockiness, and gravel on the surface.

Genesis, Morphology, and Classification of Soils

Genesis and Morphology [5]

Soil is the product of several processes acting simultaneously upon the earth's surface. Using an analogy, soil is the "rust" or "weathering rind" on the earth's skin. The morphological characteristics of the 52 soil series mapped in Baltimore County have developed through a unique set of processes acting upon various geologic materials. Simonson (*9*) outlined four basic kinds of changes taking place in the soil system during pedogenesis (soil formation). These include additions, removals, transfers, and transformations. For example, organic matter, fertilizer, dust, and other materials can be added to soils, while soluble salts and basic ions released in the weathering of certain minerals are removed to varying degrees. Clay particles and iron are transferred within the soil profile. Such soil minerals as feldspar and mica are transformed to clay minerals.

The intensity and magnitude of these changes are directed by the factors of soil formation. Soil scientists recognize five soil-forming factors whose combined influence determines the nature and properties of the soil profile. These five factors are parent material, climate, living organisms, relief, and time. These factors do not act independently but overlap and each tends to modify the influence of the other. Climate and living organisms act on the parent material whereas the relief and time factors are passive and simply modify this interaction. Each of the soil-forming factors, as they apply to the distribution and morphology of soils in Baltimore County, is discussed in the paragraphs that follow.

Parent material.—Soils tend to inherit some of their characteristics from their parent material. The various types of bedrock are broken up by the process of weathering—disintegration by physical forces and decomposition by chemical processes. The unconsolidated residuum or residue which results from this action is the parent material from which soils form. Thus, soils formed from residuum weathered from bedrock that contained a large quantity of mica generally inherit some of this mica in the composition of their mineralogical skeleton. Soils formed in Coastal Plain sediment containing mostly quartz, or kaolinite clay, generally contain a predominance of these minerals. Soils formed from coarse-textured or sandy sediment generally keep this characteristic throughout their history whereas soils formed from clayey sediment generally are fine textured. The extent to which soil characteristics are inherited from the parent material is modified and, in fact, often masked by the influence of the other factors of soil formation.

About 70 percent of Baltimore County lies within the Piedmont physiographic province east of the Blue Ridge. The bedrock is a complex array of metamorphic and igneous rocks that have weathered to form the parent material for the soils in this section of the county. The highly crystalline schist and gneiss formations are some of the oldest rocks in the geologic time scale, dating back to pre-Cambrian age—at least 500 million years old. Nearly 200,000 acres of soil, or more than half of Baltimore County, formed in parent material derived from these micaceous schist bedrocks. Other rocks which overlie these older formations and are exposed in places include marble, quartzite, and younger intrusions of gabbro, serpentine, granite, diorite, and diabase.

Overlying the bedrock formations in the southeastern part of the county is the unconsolidated sediment of the Atlantic Coastal Plain. About 30 percent of the county is covered by these relatively young deposits of gravel, sand, silt, and clay which are present in various proportions. These deposits are the parent materials (fig. 19) for the soils in this section of Baltimore County.

In the upper part of the Coastal Plain immediately adjacent to the Piedmont bedrocks, the Patuxent formation of Early Cretaceous age and the Arundel clay and Patapsco formation of Late Cretaceous age are exposed. This unconsolidated Cretaceous sediment provides the parent materials for the soils in this region. Where the heavier textured materials are clays and silty clays, the Christiana soils have formed. A thin layer of silty material commonly covers these deposits and it is within this material that Chillum, Beltsville, and Leonardtown soils have formed. In the very gravelly areas, the Joppa soils have formed. In the southeastern part of the county, at

[5] By DR. F. P. MILLER and DR. J. E. FOSS, Dept. of Agronomy, University of Maryland.

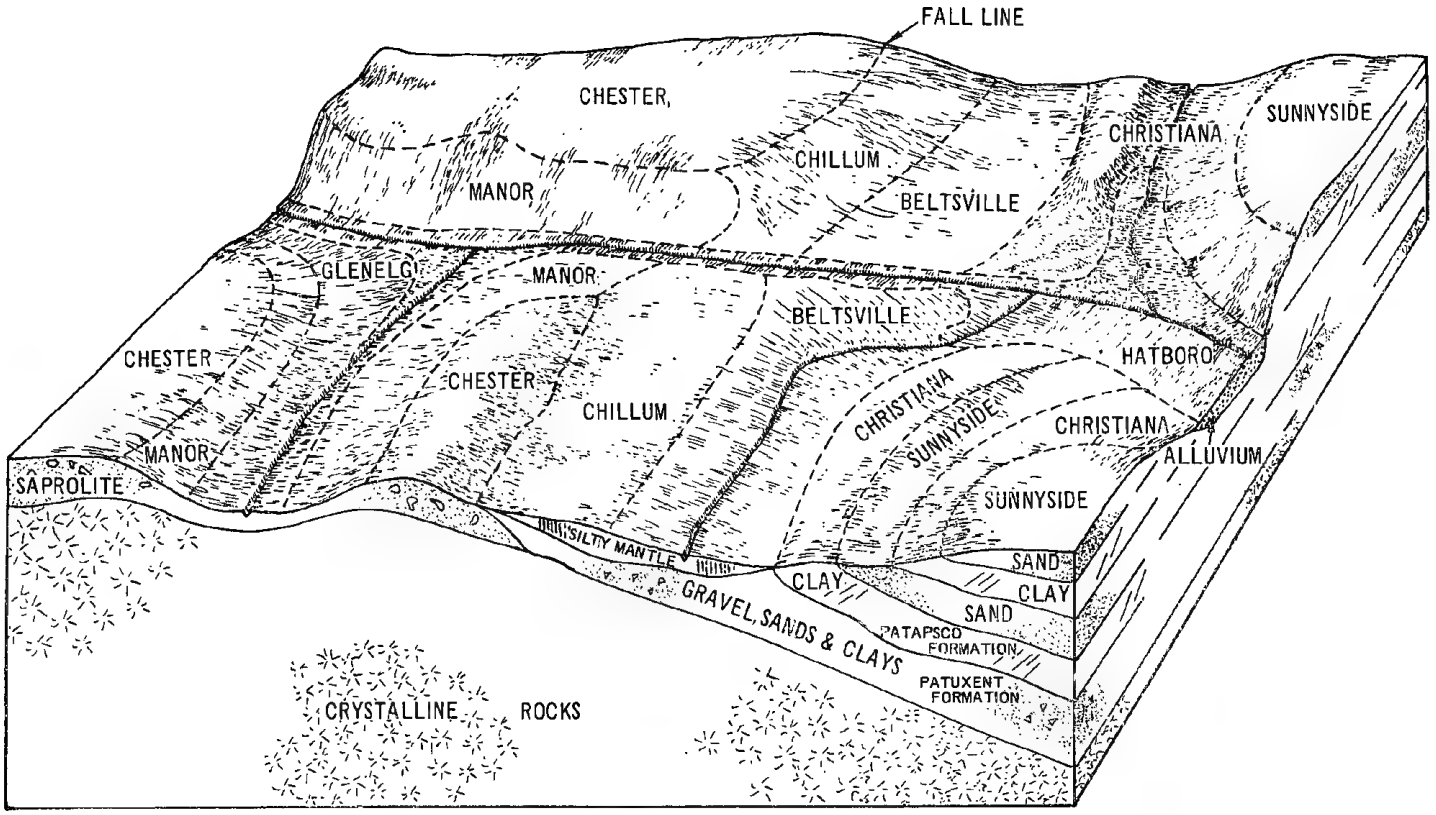

***Figure 19.*—Cross section showing relationships of parent material and topography to certain soil series of Baltimore County. Fall line shown in drawing separates soil of Piedmont Province (left) from soils of Atlantic Coastal Plain (right).**

lower elevations adjacent to Chesapeake Bay, are the younger Quaternary deposits, much of which are also covered by a mantle of silt, possibly Pleistocene loess. Matapeake, Mattapex, Barclay, and Othello soils have formed in this material. Sunnyside, Sassafras, Woodstown, Fallsington, Fort Mott, and Pocomoke soils are located where this sediment is sandy, and Galestown where it is very sandy. The layered nature of these Cretaceous and Quaternary deposits provides a variety of parent materials from which the soils common to the Coastal Plain have formed.

Alluvium transported by streams and deposited along flood plains is the parent material for the youngest soils in these landscapes. Codorus, Comus, Hatboro, and Iuka soils are typical of those that formed in this recent alluvium.

The parent materials of the soils in Baltimore County are extremely diverse, ranging from some of the oldest rocks on the Mid-Atlantic coast to the younger unconsolidated Coastal Plain sediment that varies in texture from clay to gravel and sand. Thus, the parent material has provided the mineral components of the resulting soils, influencing both the texture and mineralogy of the soil. Studies by Fanning (*4*) have shown that soils of the Coastal Plain are quite uniform in clay mineralogy and contain about equal amounts of chlorite, mica, and kaolinite or intergradient chlorite. This is probably a reflection of the importance of parent material in clay mineralogy. Clays in Piedmont soils, however, are dominated by kaolinite and mica, with lesser amounts of chlorite, vermiculite, and montmorillonite. In the more well developed soils, such as those of the Neshaminy and Chester series, gibbsite is found. The greater content of Kaolinite and the occurrence of gibbsite indicate that the Piedmont soils show a higher degree of weathering, as contrasted with the Coastal Plain soils.

Climate.—Climate strongly influences the soil weathering process and the vegetation which in turn further modifies this process. In the humid, continental climate typical of the Mid-Atlantic region, the soils of Baltimore County reflect the impact of this weathering process by the clearly defined horizons typical of several of the soils. Climatic data for the county are recorded in tables 11 and 12 in the section "General Nature of the County."

Rainfall influences soil formation by erosion through runoff and by the leaching effect of water percolating through the soil profile. Erosion is particularly severe on soils that are steep. Erosion, rapid runoff, and the resultant less intensive soil-weathering process cause many of these soils to be shallow and less well defined than their more level counterparts. Accelerated erosion resulting from man's influence, however, has also contributed to the shallow nature and exposure of lower horizons at the surface in soils on sloping landscapes.

Many elements are removed from the soils by the leaching action of precipitation during soil formation. For example, the soluble salts and the basic ions (calcium, magnesium, potassium, and sodium) that are released in weathering of certain minerals are leached in varying degrees from the soils. As a result of this leaching,

the soil generally is strongly acid to slightly acid in the solum of most soils in Baltimore County. The exchange sites (or negatively charged locations) on clay and organic matter are thus dominated by hydrogen or aluminum ions rather than by the basic ions. The variations in the percentage of bases on the exchange sites are dependent on the amount of basic elements in the geologic material, the duration and intensity of weathering, or on possible additions of basic ions. The use of limestone, for example, has added basic elements in the plow layer of many soils used for farming.

Figure 20 shows an important result of weathering, the formation of argillic, or clayey, horizons. The weathering of coarser separates to clay and its subsequent movement in suspension by water and development in place forms the argillic or B2t horizons. In addition to the increase in amount of clay in argillic horizons, evidence of this clay movement can be seen as thin coatings or clay skins on the surface of the natural structural units or peds.

The argillic horizon influences many of the properties of soil such as drainage, available water capacity, shrink-swell potential, and permeability. The sequence of profiles illustrated in figure 20 shows a gradation from the well-expressed argillic horizon of the Elioak series to the moderately expressed argillic horizon of the Glenelg series, and to the B horizon of Manor soil which has only a slight evidence of clay movement. The B2 horizon of the Manor soil is not an argillic horizon but is termed a cambic horizon.

Translocation of iron from the surface horizons to the B horizon is also noted in these same profiles. The weathering of iron-bearing minerals in the A horizon releases iron and, with the subsequent iron movement to lower horizons, results in light-colored A2 horizons and brown or reddish-brown B horizons in many soils in Baltimore County.

Baltimore County is located slightly south of the latitude which is midway between the North Pole and the equator, and the degree of expression in soil horizons is intermediate between these two extremes. The soils are more weathered and much deeper than those in the polar regions. They are not so highly weathered and deep as the soils in tropical latitudes where climate commonly completely masks the influence of differing parent materials—again reflecting the active role that climate plays in soil formation. In Baltimore County soil properties related to parent material are evident enough to serve as useful criteria in distinguishing soil series. Precipitation in excess of evaporation results in leaching; wetting and drying result in expansion and contraction, which subsequently forms soil structure; and the continuous process

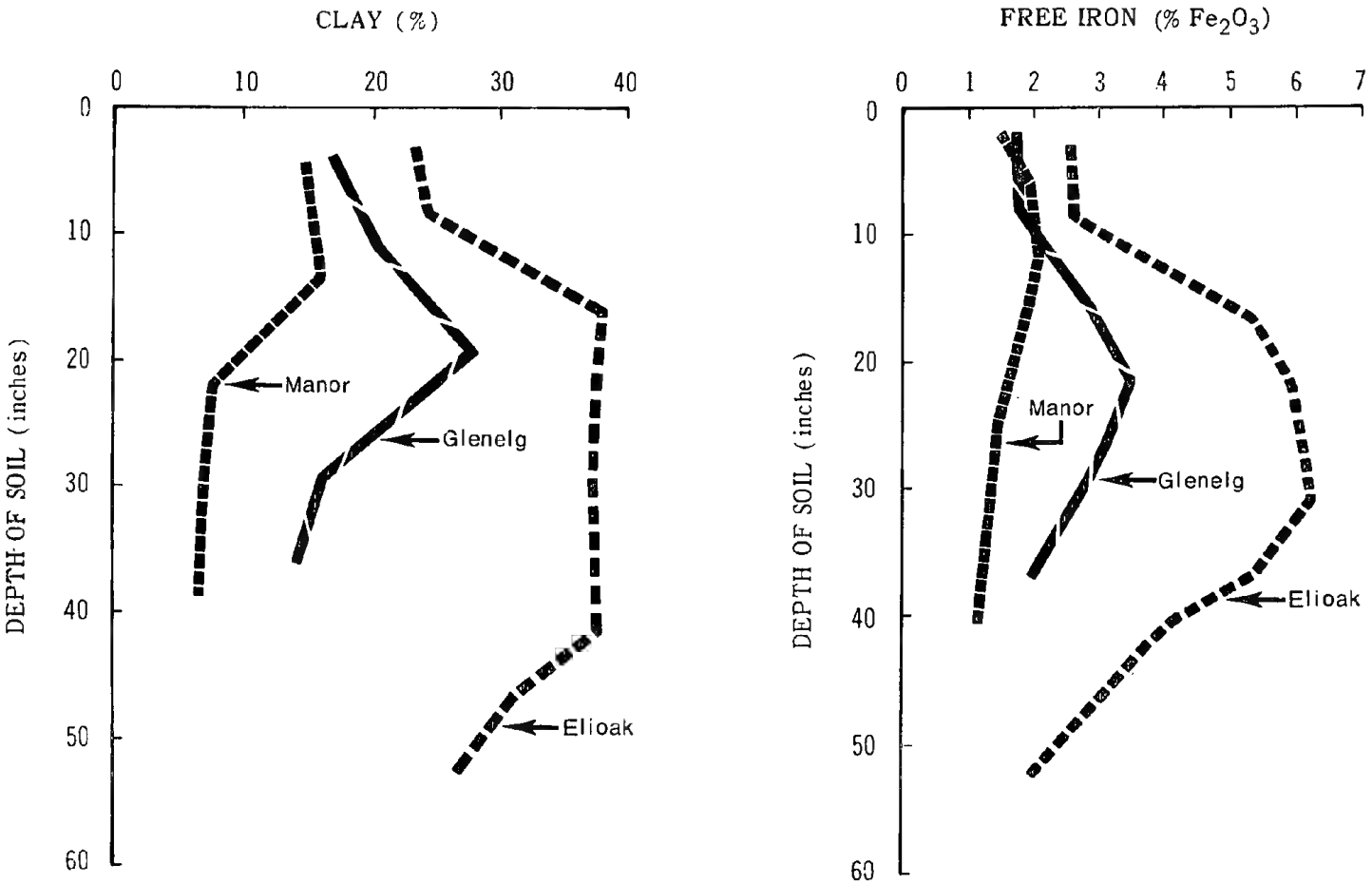

Figure 20.—The percentage of clay and free iron (Fe_2O_3) in three soil profiles of a developmental sequence from the Piedmont Province area of Maryland (*5*).

of mineral weathering eventually produces a soil in dynamic equilibrium with its environment, as modified by the other factors of soil formation. Thus, soil is the weathering product or "rind" of the earth, and many of the soil characteristics are directly related to the climate in which they formed.

Plant and animal life.—One of the features of soil which distinguishes it from the raw parent material, sand, or a pile of rocks is the organic constituent consisting of both the living plants and animals and their decaying remains. As climatic processes begin to act on parent material to start formation of soil, plant and animal life soon accelerate the weathering process. The resulting soil is a product of the combined influence of these two processes as modified by the parent material, relief, and time.

Early in the formation of soil, primitive forms of life were influencing the weathering process. Lichens, algae, bacteria, fungi, and other simple living organisms were struggling for existence and predominance. Even today these precursors of soil formation can be seen in Baltimore County on rock outcrops and ledges. Many examples are evident in the Soldier's Delight area where the serpentine bedrock, which is very resistant to weathering and possibly provides an unsatisfactory chemical environment for higher plants, is still exposed and encrusted with lichens.

As time progressed, these simple life forms eventually yielded to a more complex system, culminating in the climax stage where the vegetation and animal life were in equilibrium with their environment. Before clearing by man, this climax stage in Baltimore County consisted of deciduous hardwood forests that had probably no more than 5 to 10 percent native coniferous species. The ridges and rolling uplands were dominated by chestnut and scarlet oak trees. At the turn of the century, the chestnut trees succumbed to blight and have since been replaced by a natural succession of oak, poplar, and hickory. On the slopes, the scarlet, black, and white oak trees predominated in association with red oak, yellow-poplar, beech, and hickory. Red maple, ash, elm, birch, and sycamore trees dominated the flood plains and low flat lands.

Although these tree species are the most obvious of the living organisms on the landscape, many other life forms greatly influence soil formation. These are the microorganisms, earthworms, larvae, insects, rodents, and the many fungi and bacteria so important to the cycle of decay, decomposition, and regeneration of vegetation. The cycle of this life system produces a large turnover in nutrients and organic matter. As nutrients are taken up by the plants, they are eventually returned to the soil through leaf fall and the eventual decomposition of the whole plant itself. In the process, however, organic matter has been produced and its decomposition product—humus—is worked into the upper layers of the soil by such life forms as earthworms, rodents, and decaying roots. A number of other processes, including windthrow of trees, have also mixed the various components of the soil.

Wright [6] found that the Ap horizon in the Piedmont and Coastal Plain soils of Maryland averaged 2.4 and 1.6 percent organic matter, respectively. In the B horizon of these soils, organic matter is less than 0.4 percent. Therefore, most of the organic matter generally is concentrated in the upper few inches of soil. Exceptions to this are noted in Tidal Marsh or soils that have very poor drainage, such as those in the Pocomoke series.

During the warm period of summer this, organic matter is constantly oxidized to carbon dioxide, water, and a complex of organic acids and other compounds. These acids, in combination with carbonic acid derived from the carbon dioxide dissolved in water, eventually percolate into and through the soil profile—enhancing the leaching process and rendering the soils acid which is the universal result when soils form under forests of deciduous trees and conifers. The constant addition of organic matter from vegetation, its decay, mixing and subsequent oxidation result in a natural regulation of organic matter in Baltimore County soils. It is for this reason that Baltimore County farmers cannot sustain organic matter in the plow layers above the 2 to 4 percent range regardless of the amounts they add.

Man has cleared the land, cut and altered native forests, cultivated the upper soil horizons, accelerated erosion through tillage, introduced new plant species, and added lime and plant nutrients. This usage in addition to drainage, and grading for his urban uses, has greatly altered the environment from that under which the soils formed. These changes will likely start the formation of new soil characteristics, as an equilibrium is established between the soil and this new environment. This shift in equilibrium will result in alteration of the soils, but it will be a very slow process for most of them. In Europe, however, soils which have been cultivated for centuries are easily distinguishable today from nearby virgin soils both in morphology and chemical properties. This observation emphasizes that man must be considered as a major component of the fauna involved in the soil-forming process.

Relief.—Baltimore County has a wide variety of relief ranging from nearly level to gently rolling landscapes of the Coastal Plain to rolling uplands of the Piedmont province that are cut by many stream valleys. The Coastal Plain is underlain by nearly horizontal beds of unconsolidated sediment which act as a controlling factor on the relief, and the Piedmont province is underlain by a variety of bedrocks. These rocks of the Piedmont differ in their susceptibility to weathering and erosion. Thus, the broad valley floors, such as the Greenspring, Worthington, Cockeysville, and Dulaney Valleys, which are underlain by Cockeysville marble, have relatively smooth relief. The uplands, underlain by a complex of schist, granite, and other rock types generally are 200 to 300 feet above the valley floors. The uplands of the Piedmont and the higher portion of the Coastal Plain are strongly dissected. The elevation ranges from sea level to 960 feet at Stiltz on the Pennsylvania border—the highest point in the county.

The shape of the landscape as well as its elevation orientation, and gradient influences soil formation. Even though the same parent material prevails in an area, soils formed on the steeper gradients generally are shallower and have less well-expressed horizons than soils formed

[6] WRIGHT, W. R. CONTRIBUTIONS OF CLAY AND ORGANIC MATTER TO THE CATION-EXCHANGE CAPACITY OF MARYLAND SOILS. University of Maryland M. S. Thesis. 1969.

on the more nearly level parts of the landscape. The more nearly level the topography, the more likely the area is to have poor drainage and high water tables.

The Manor, Mt. Airy, and Brandywine soils of the Piedmont are well-drained to somewhat excessively drained soils and generally are on the steeper parts of the landscape. As the relief becomes more gently rolling, the well-drained Chester, Elioak, and Glenelg soils prevail. These soils are in equilibrium with their environment and have more strongly expressed profiles. Where the Piedmont landscape is nearly level, the moderately well drained and somewhat poorly drained Glenville soils are common. The poorly drained Baile and Watchung soils are on flat and depressed areas, especially around the heads of drainageways and on foot slopes. Poorly drained soils formed in alluvium are in this physiographic province. Within the Piedmont part of Baltimore County, 56 percent of the soils have slopes of less than 8 percent and 25 percent of the soils have slopes greater than 15 percent. The remaining 19 percent of the soils have slopes of 8 to 15 percent.

Seventy-three percent of the soils on the Coastal Plain of Baltimore County slope less than 5 percent, and only 4,200 acres, or 6 percent of the upland soils in the county, are poorly drained or very poorly drained. These poorly drained soils are in the nearly level and depressed parts of the Coastal Plain and include the Elkton, Othello, Leonardtown, and Fallsington soils and the very poorly drained Pocomoke soils. These soils must be drained for use in farming and, if used for homesites and other urban uses, they pose serious problems which must be overcome, especially if onsite sewage disposal is required. More than 7,600 acres of soils in the Coastal Plain slope more than 10 percent. Comparison of these slope categories illustrates the more rolling and dissected nature of the Piedmont part of the county as contrasted to the Coastal Plain.

Time.—The amount of weathering and degree of soil profile expression are the result not only of the intensity of the soil forming processes but also of their duration. The parent materials in the county range from those derived from the very old Early Pre-Cambrian Baltimore gneiss to the most recently (Holocene) deposited alluvium along the flood plains and Tidal marshes. As the soil-forming processes act on these materials, the characteristics of the soil profile are slowly developed. The more soluble materials such as calcium carbonate are leached downward, organic matter starts to accumulate, color and soil reaction reach their ultimate expression, and structure and texture finally reach equilibrium. As the soil profile reaches maturity, the sequence of horizons and their characteristics are in equilibrium with the soil-forming environment.

Not only are the duration and intensity of the soil-forming processes important to the expression of properties in the soil profile, but the ease or difficulty with which the processes act on the parent materials is also important. It is for this reason that the degree of expression of a particular soil property is not necessarily related directly to the age of the parent rock or geomorphic surface. Although the Brandywine soil formed in residuum weathered from the Baltimore gneiss, it has much weaker expressions of soil feature than the Neshaminy or Sassafras soils which formed in much younger parent materials. This comparison illustrates that the length of time that weathering takes place is not necessarily the dominating influence on soil formation. Thus, the combination which ultimately controls the character of the soil profile is duration and intensity of weathering and the weatherability of the material. As a result of this reasoning, soil scientists have stated that time is an essential factor in soil formation, but that it is not a causative factor.

Classification of Soils [7]

Soils are classified to enable communication about them and to show relationships among them. Soils can be classified by many different systems. For instance, a system could be devised to classify soils according to a single criterion, such as their suitability for growing cotton. In such a classification all the soils of Baltimore County would be unsuitable because they occur in a climatic zone that is too cold for this crop. Such an interpretive classification would be good for the single purpose of telling suitability for cotton production, but it would not be of much use for other purposes.

The classification system employed here (*10*, *13*) is based on many soil properties and it has several levels of classes; thus it encompasses and is capable of feeding back much information about the soils. This allows interpretations based on the classification and survey to be made for many different purposes.

Six levels of classification are employed. These levels are referred to by soil scientists as categories. The classification units within each level are based on various carefully defined soil characteristics (*13*). In addition each of the soil series (classes at the lowest level of classification) are further subdivided into phases in field mapping. The phase separations are based on the slope of the soil, its degree of erosion, stoniness, surface texture, etc. In the past the surface texture of a soil series (e.g., Beltsville silt loam) has comonly been referred to as a distinct category, the soil type. This is no longer done as an official part of the classification system, but the use of this terminology by some will remain.

A systematic nomenclature system is used for the classes of the 4 highest categories (orders, suborders, great groups, and subgroups) (tables 9 and 10). From the names of these classes a large amount of information about the soils in the classes can be derived. To do this, however, one must "know the language." Table 10 is provided to help understand the origin and connotation of each of the formative elements that are used in names of the classes recognized in Baltimore County and should be used in conjunction with table 9. These formative elements are for the most part taken from Latin and Greek roots. Some additional explanation is given in the following text.

The classification system places all known soils into 10 orders. Representatives of five of these have been recognized in Baltimore County (table 9). A short description of each of these five is given in table 10. Soils of the other five orders (Vertisols, Aridisols, Spodosols, Oxisols, and

[7] By Dr. D. S. Fanning, associate professor of soil classification and mineralogy, University of Maryland.

TABLE 9.—*Soil series classified according to the current system of classification*

Series	Family	Subgroup	Order
Aldino	Fine-silty, mixed, mesic	Typic Fragiudalfs	Alfisols.
Baile	Fine-loamy, mixed, mesic	Typic Ochraquults	Ultisols.
Baltimore	Fine-loamy, mixed, mesic	Mollic Hapludalfs	Alfisols.
Barclay	Coarse-silty, mixed, thermic	Aquic Dystrochrepts	Inceptisols.
Beltsville	Fine-loamy, mixed, mesic	Typic Fragiudults	Ultisols.
Brandywine	Sandy-skeletal, mixed, mesic	Typic Dystrochrepts	Inceptisols.
Captina	Fine-silty, mixed, mesic	Typic Fragiudults	Ultisols.
Chester	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols.
Chillum	Fine-silty, mixed, mesic	Typic Hapludults	Ultisols.
Christiana	Clayey, kaolinitic, mesic	Typic Paleudults	Ultisols.
Chrome	Fine, mixed, mesic	Typic Hapludalfs	Alfisols.
Codorus	Fine-loamy, mixed, mesic	Fluvaquentic Dystrochrepts	Inceptisols.
Comus	Coarse-loamy, mixed, mesic	Fluventic Dystrochrepts	Inceptisols.
Conestoga	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Delanco	Fine-loamy, mixed, mesic	Aquic Hapludults	Ultisols.
Dunning	Fine, mixed, noncalcareous, mesic	Fluvaquentic Haplaquolls	Mollisols.
Edgemont	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols.
Elioak	Clayey, kaolinitic, mesic	Typic Hapludults	Ultisols.
Elkton	Clayey, mixed, mesic	Typic Ochraquults	Ultisols.
Elsinboro	Fine-loamy, mixed mesic	Typic Hapludults	Ultisols.
Fallsington	Fine-loamy, siliceous, mesic	Typic Ochraquults	Ultisols.
Fort Mott	Loamy, siliceous, mesic	Arenic Hapludults	Ultisols.
Galestown	Sandy, siliceous, mesic	Psammentic Hapludults	Ultisols.
Glenelg	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols.
Glenville	Fine-loamy, mixed, mesic	Aquic Fragiudults	Ultisols.
Hagerstown	Fine, mixed, mesic	Typic Hapludalfs	Alfisols.
Hatboro	Fine-loamy, mixed, nonacid, mesic	Typic Fluvaquents	Entisols.
Hollinger	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Iuka	Coarse-loamy, siliceous, acid, thermic	Aquic Udifluvents	Entisols.
Joppa	Loamy-skeletal, siliceous, mesic	Typic Hapludults	Ultisols.
Kelly	Fine, mixed, mesic	Aquic Hapludalfs	Alfisols.
Legore	Fine-loamy, mixed, mesic	Oxic Hapludalfs	Alfisols.
Lenoir [1]	Clayey, mixed, thermic	Aeric Paleaquults	Ultisols.
Leonardtown	Fine-silty, mixed, mesic	Typic Fragiaquults	Ultisols.
Lindside	Fine-silty, mixed, mesic	Fluvaquentic Eutrochrepts	Inceptisols.
Manor	Coarse-loamy, micaceous, mesic	Typic Dystrochrepts	Inceptisols.
Matapeake	Fine-silty, mixed, mesic	Typic Hapludults	Ultisols.
Mattapex	Fine-silty, mixed, mesic	Aquic Hapludults	Ultisols.
Melvin	Fine-silty, mixed, nonacid, mesic	Typic Fluvaquents	Entisols.
Montalto	Fine, mixed, mesic	Ultic Hapludalfs	Alfisols.
Mt. Airy	Loamy-skeletal, micaceous, mesic	Typic Dystrochrepts	Inceptisols.
Neshaminy	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols.
Othello	Fine-silty mixed, mesic	Typic Ochraquults	Ultisols.
Pocomoke [1]	Coarse-loamy, siliceous, thermic	Typic Umbraquults	Ultisols.
Relay	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Sassafras	Fine-loamy, siliceous, mesic	Typic Hapludults	Ultisols.
Sunnyside	Fine-loamy, siliceous, mesic	Typic Hapludults	Ultisols.
Watchung	Fine, mixed, mesic	Typic Ochraqualfs	Alfisols.
Woodstown	Fine-loamy, siliceous, mesic	Aquic Hapludults	Ultisols.

[1] The mean annual temperature of these soils in Baltimore County is a few degrees cooler than defined for the series, but this does not alter their usefulness or behavior.

Histosols) have not been recognized. The soil series representing the Entisols and Mollisols are not extensive in Baltimore County; thus most of the soil series are classified into the Inceptisols, Alfisols, and Ultisols. The Alfisols and Ultisols both have subsurface horizons of clay accumulation. They are distinguished from each other according to the amount of bases (mainly calcium and magnesium) that are associated with the clay in the lower parts of the profiles of these soils. Because they contain more bases, the Alfisols normally have higher natural fertility than the Ultisols. The soils of the Inceptisol order are young soils that have small increases in clay in subsurface layers relative to that in surface horizons. Inceptisols do have subsoils that show alteration of the parent material by soil-forming processes. This separates them from the Entisols, which have little evidence of this alteration.

Nine suborders have been recognized in Baltimore County (table 9). The distinctions and similarities between them may be understood in terms of the name stems used to designate them within the orders (table 10). Sixteen great groups are recognized in the county (table 9). As with the suborders, the name stems used to designate them are keys to the main characteristics used to separate them within the suborders.

Twenty-six subgroups are recognized in Baltimore County. Subgroups are defined in terms of how they depart from the central concept of the respective great group. Typic (central concept of the great group) sub-

groups are defined for all great groups, however typic subgroups were not found in Baltimore County for all of the great groups recognized there. Other subgroups within a great group are defined on the basis of how they differ from the typic subgroup.

TABLE 10.—*Terminology used in the names of orders, suborders, great groups, and subgroups that have been recognized in Baltimore County* [1]

ORDER NAMES

Names of soil orders end in "sol" (solum [2], soil), and contain a formative element used as the final syllable in the names of the suborder, great group, and subgroup classes.

Entisols	Soils that have no pedogenic horizons. Formative element: ent, which has the connotation of recent.
Inceptisols	Soils that have weakly expressed horizons that show alteration of parent materials. Formative element: ept, which has the connotation of beginning.
Mollisols	Soils that have nearly black, organic, rich, surface horizons and high base supply. Formative element: oll, which has the connotation of soft.
Alfisols	Soils that have gray to brown surface horizons, medium to high base supply, and subsurface horizons of clay accumulation. Formative element: alf, derived from pedalfer, a term used in the former system of soil classification.
Ultisols	Soils that have horizons of clay accumulation and low base supply. Formative element: ult, with the connotation of last.

STEMS USED IN SUBORDER NAMES

These stems are placed before the formative element of the order names to form suborder names.

Fluv	Fluvius [2], river, soils formed in alluvium.
Ochr	Base of ochros [3]: pale; soils that have little organic matter.
Aqu	Aqua [2], water; soils that are wet for long periods.
Ud	Udus [2], humid; of humid climates.

STEMS USED IN GREAT GROUP NAMES

These stems are attached in front of suborder names to form great group names.

Udi	Udus [2], humid; of humid climates.
Hapl	Haplous [3], simple; the least advanced horizons, generally typifies the suborder.
Dystr	Modified from dys [3], faulty or bad; naturally infertile.
Eutr	Modified from eu [3], good; naturally fertile.
Ochr	Base of ochros [3]; pale; soils that have little organic matter, a light-colored surface layer.
Frag	Modified from fragilis [2], brittle; a dense, brittle pan.
Umbr	Base of umbra [2], shade; soils that have a nearly black, organic rich surface horizon and low base supply.
Pale	Paleos [3], old; soils, advanced development.

See footnotes at end of table.

TABLE 10.—*Termniology used in the names of orders, suborders, great groups, and subgroups that have been recognized in Baltimore County*—Continued

SUBGROUP TERMINOLOGY

These terms are used as modifying words, adjectives, before great group names to form subgroup names.

Typic	Modified from type, typical; this subgroup typifies the central concept of the great group.
Fluventic	The soil has characteristics of the Fluvents suborder; alluvial influence.
Aquic	The soil has some characteristics of poor natural drainage although not sufficient for its placement in an Aqu suborder.
Mollic	The soil has a surface horizon that is darker in color than typical for this great group.
Ultic	The soil has a lower base supply than typical for Alfisols and thus approaches Ultisols in this property.
Aeric	The soil is somewhat better aerated, better drained, than typical for the wet (aqu) suborders.
Psammentic	The soil is intergradient toward the Psamments, which are a suborder of sandy (psammos [3], sand) Entisols.
Arenic	Arena [2], sand, the soil has a thick sandy surface layer.

[1] Explanations of this terminology have been adapted from publications on the comprehensive soil classification system (*13*).
[2] From the Latin.
[3] From the Greek.

Forty families are recognized in Baltimore County. Families are defined within subgroups based on soil texture, mineralogy, temperature, and for some groups of soils upon reaction (degree of acidity). The textural classes are based on the texture of a subsurface control section considered to be important in controlling the moisture regime of the soil. The broad textural groups used in Baltimore County are sandy, loamy, silty, clayey, and skeletal. In many cases the loamy soils are subdivided into coarse loamy (less than 18 percent clay) and fine loamy (18 to 35 percent clay). The silty soils are subdivided into coarse silty and fine silty on the same basis. Clayey soils have control sections that contain more than 35 percent clay. Clayey soils are subdivided into the fine (35 to 60 percent clay) and very fine (greater than 60 percent clay) classes for some orders. Skeletal soils have control sections that have more than 35 percent by volume of gravel and rocks, or both.

The mineralogy classes are based upon the mineralogy of the same depth control section as for the texture classes. For the clayey soils these classes are based on the mineralogy of the clay. For the other textural classes the mineralogy classes are based on the mineralogy of the silt and sand. Most of the Baltimore County soils are considered to have mixed mineralogy. However, two of the clayey soils, Elioak and Christiana, are considered to have kaolinitic clay. Kaolinite is a clay mineral that is relatively unreactive, has low shrink-swell properties, and usually indicates a high degree of weathering. Several of the sandy and loamy Ultisols are considered to have siliceous mineralogy. This indicates that more than 90 percent

of the silt and sand particles of these soils are composed of quartz and other inert minerals. The Manor and Mt. Airy soils have micaceous mineralogy. Most of the sand and silt fractions in the control section of these soils should contain more than 40 percent mica by weight.

The soils in Baltimore County are considered to fall entirely within the mesic soil temperature zone. Soils of this class have temperatures at a depth of 20 inches that have 5° C. (9° F.) or more difference between average summer (June, July, August) and average winter (December, January, February) temperatures and the average annual temperature at this depth is 8° to 15° C. (47° to 59° F.). Since average annual soil temperatures are considered to be about 2° F. warmer than average annual air temperatures, the average annual soil temperatures in Baltimore County are about 55° F. in the northern part of the county and about 59° F. near Chesapeake Bay. Thus the area near the Bay approaches the soil temperature zone referred to as thermic. The soil series of table 9 shown as thermic soils in Baltimore County are soil series used in more southern latitudes. These soils are similar, in all respects except temperature, to those of Baltimore County. Because of the small extent and similarity in properties other than soil temperature, corresponding series with mesic temperature regimes have not been used.

It is interesting to note that some soil families in Baltimore County contain several soil series. This is particularly true of the fine loamy, mixed, mesic family of Typic Hapludults, which has four soil series that are recognized in the county. Although different soil series within the same family have many similarities, they differ sufficiently in such characteristics as color, degree of expression, mineralogy, and other characteristics to be recgonized as distinct soil series.

It should be recognized that the soil series as mapped often do not fit exactly in the classes given in table 9 as these are defined by the classification system. Inaccuracies arise because only samples of the soils can be examined during the mapping and because of cartographic problems; the smallest area that can be separated at the scale of mapping used in Baltimore County is about one or two acres and only a small number of these areas can be shown. Also it is necessary to make most mapping separations based on field estimates of the soil properties. However, even where the soil is not placed in the correct class, the class in which the soil is mapped will closely approximate the correct class for a large percentage of the area so mapped.

The classification system described here and employed in this soil survey (*13*) has been developed through cooperative efforts of many scientists. Before this became the official system of the cooperative soil survey, a system that was first published in the 1938 U.S. Dept. of Agriculture Yearbook (*2*) was employed. This system was revised later (*11*). One of the main categories of that system that was much used, other than the soil series (which has been retained from the older into the present system), was the great soil group.

Various classes of the present system correspond generally to some of the great soil groups of the older system. The Fluvents and most of the Fluventic subgroups of other great groups used in Baltimore County generally correspond with the great soil group referred to as Alluvial soils. Most of the soils of the Aqu (wet) suborders correspond to the great soil group called Low Humic Gleys. However, the Umbraquults, and perhaps also the Fluventic Haplaquolls, would have been placed in the Humic Gley great soil group. The Dystrochrpts, other than those in Fluventic subgroups would be placed in the Sols Bruns Acides great soil group. Most of the Udalfs and Udults of Baltimore County were formerly considered to be transitional between the Gray Podzolic and Red-Yellow Podzolic soils.

General Nature of the County

Additional information about the survey area is given in this section. This information will be most useful to persons not familiar with Baltimore County. Briefly discussed are history, population, industry and transportation, community facilities, physiography, drainage, relief, geology, climate, farming, and water supply. More detailed information can be obtained from the Baltimore County Office of Planning and Zoning.

The Susquehannough Indians were the earliest recorded inhabitants of what is now Baltimore County. Since they were hunters, they moved frequently and left few or no permanent marks on the land. Algonquin Indians also inhabitated the area and were its first known farmers. Before 1650 they raised corn, squash, and beans in small clearings.

There is no record of the exact date of the first European settlement in the county, though it was obviously before formal recognition as a county, about 1659. At that time the county included what are now Harford, Cecil, and perhaps Kent Counties; boundaries were generally undefined (*8*).

During most of the 17th century tobacco dominated farming and most other aspects of colonial life. Laws had to be enacted to compel the growing of grain for food and to regulate the tobacco trade. During the latter part of the 18th century the milling of flour from wheat became a major enterprise, and by about 1850 the county was known worldwide for its flour. The county was named for Lord Baltimore.

In 1790 the population of Baltimore County was 25,434. By 1810 it was 40,227. Populaton remained fairly constant until 1860 when it reached 54,135. In 1920 the population was 74,817. Since then the population has more than doubled each 20 years and it is now densely setted. The 1960 population was 492,428, and is projected by the Baltimore Regional Planning Council to be over a million by 1985.

There are more than 5,600 business firms in Baltimore County, and they employ over 120,000 persons. Industry is tremendously diversified. Most of the heavy industry, including one of the largest steel mills in the world, is located in the southeastern portion, on or near the waterfront. There are eleven significant industrial parks in the county, most of them adjacent to the Baltimore Beltway. These provide attractive sites for industries of national and international scope.

Three railroads serve the county, the Penn-Central, the Baltimore and Ohio, and the Western Maryland.

Penn-Central provides high-speed passenger service to Washington, Philadelphia, and New York.

The Dundalk marine terminal is a deep-water port facility that handles general and specialized cargos. It has a continuing expansion program. In addition to wide pier aprons, gantry cranes, and covered storage, it has the most modern equipment for handling containerized cargo.

Several private airfields serve the county. The county is also served by Friendship International Airport in adjacent Anne Arundel County.

The county has an extensive network of roads and highways, including routes 70N, 83, 95, and 695 of the relatively new Interstate system.

A Metropolitan Transit Authority, in which Baltimore County is represented, serves the region. There are four modern general hospitals in Baltimore County, as well as three large special hospitals. There are 16 libraries in the county. Communities not served by libraries utilize the Bookmobiles of the library system.

School planning, expansion, and development are continuing processes. There are 104 elementary, 23 junior high, and 17 high schools in the county, and more are in various stages of construction. The county also has 3 new vocational schools and 6 special schools. All schools are used for community recreational purposes under a dual-use policy that identifies school buildings as "school-recreation centers." Colleges in the county include the University of Maryland, Baltimore County campus; Towson State College; Goucher College, Catonsville Community College; Essex Community College; and Dundalk Community College. There are numerous private schools at various levels.

Recreational facilities are abundant and varied. In addition to "school-recreation centers," the county maintains many parks, golf courses, and recreation areas. Parts of Gunpowder State Park and Patapsco State Park are in Baltimore County.

Physiography, Relief, Drainage, and Geology

Baltimore County lies within two physiographic provinces, the Atlantic Coastal Plain and the Piedmont Plateau.

Most of the county is geologically a very old plateau, dissected by many streams and drainageways. The topography generally is rolling. There are some gentle slopes and many areas that are hilly. The valleys of Gunpowder Falls, Little Gunpowder Falls, the Patapsco River, and Little Falls are more than 100 feet deep and are bordered mainly by rough hilly areas. There are a number of narrow limestone basins in the central part of the county, that have gentle topography but steep bounding slopes. The Coastal Plain is in the southeastern part of the county, adjacent to Chesapeake Bay. It ranges from a low marine terrace near the Bay to older hilly deposits of clays and gravels bordering the Piedmont Plateau.

Elevations range from sea level in marshes bordering Chesapeake Bay to more than 900 feet in the northwestern part of the county. Elevations are between 200 and 700 feet in the greater part of the county. At Essex the elevation is about 20 feet; at Fullerton, about 20 feet; at Towson, about 460 feet; at Cockeysville, about 260 feet; at Hereford, about 670 feet; and at Stiltz, 960 feet.

Little Gunpowder Falls drains a narrow belt along the northeastern border of the county. Gunpowder Falls, the largest stream, flows generally southeastward across the county; it unites with Little Gunpowder Falls to form the Gunpowder River. The Patapsco River and its tributaries drain parts of the southwestern and southern areas of the county. The southeastern part of the county is drained by many small streams that flow into Middle River and Back River, which are tidal. Intensive development in the central and southern parts of the county, where large areas are under roofs and pavements, increases runoff during storm periods. This aggravates local problems of flooding and of soil stabilization and erosion.

The rock foundation of Baltimore County is comprised of a series of highly crystalline gneiss and schist of pre-Cambrian age. The oldest rock exposures are of the Baltimore gneiss, which is perhaps the oldest rock in the eastern United States. Overlying the Baltimore gneiss in most places is the Setters formation, which is a series of gneiss, quartzite, and mica schist. Over this formation is the Cockeysville marble, which is exposed mostly near the town of Cockeysville. In many places the Cockeysville marble is covered by a second series of schist, gneiss, and quartzite known as the Wissahickon and Peters Creek formations. Parts of many of the formations have been cut by gabbros, pyroxenites, peridotites, and related rocks. There are a few exposed dikes of diabase trap rock in the county.

In the Coastal Plain part of the county, the underlying rocks have been obscured by thick, unconsolidated marine sediment. In places this sediment has been removed by geologic erosion, leaving isolated "islands" of sedimentary caps, commonly quite thin, over the underlying rock materials (7).

Climate [8]

Because of its position in the middle latitudes where the general atmospheric flow is from west to east across the North American continent, Baltimore County has a continenetal type of climate with four well-defined seasons; however, the Chesapeake Bay has a modifying effect on the climate, especially in moderating extreme temperatures of those areas immediately adjacent to it.

Data in table 11 are based on the climatic record of the National Weather Service Cooperative station 2 miles to the southwest of Parkton, which is representative of the county except for the southern areas adjacent to the Chesapeake Bay.

The warmest part of the year is the last half of July when the maximum afternoon temperature averages about 89°F. Temperatures of 90°F. or higher occur on an average of 14 days per year at Parkton; however, some stations around Baltimore City have a greater number, averaging from 30 to 50 days per year. The coldest period is the last of January and the beginning of February when the early morning minimum temperature averages about 21°F. The average number of days when the minimum temperature is 32°F. or lower is 130; for stations

[8] By W. J. Moyer, climatologist for Maryland, National Weather Service, U.S. Dept. of Commerce.

TABLE 11.—*Temperature and precipitation data*

[All data from Parkton, Md., for the period 1953 through 1969]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with [1]—		Average total	One year in 10 will have—		Days with snow cover of 1 inch or more	Average depth of snow on days with snow cover of 1 inch or more
			Maximum temperature equal to or higher than	Minimum temperature equal to or lower than—		Less than—	More than—		
	°F.	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*	*Number*	*Inches*
January	37.9	19.8	56	4	2.57	1.4	4.8	10	4
February	40.4	21.4	55	7	2.88	1.3	4.1	9	4
March	49.7	28.7	69	16	3.81	1.6	6.0	4	3
April	62.7	39.5	81	28	3.42	1.7	5.1	[2]	[3]
May	71.2	48.0	86	35	3.46	1.5	8.4	0	0
June	80.1	57.5	89	46	2.85	.9	5.3	0	0
July	83.7	62.4	90	55	4.06	1.1	7.9	0	0
August	81.9	60.6	90	50	4.26	1.1	7.0	0	0
September	75.6	53.5	88	40	3.34	.8	6.4	0	0
October	65.0	42.5	79	30	3.00	1.3	5.1	0	0
November	53.1	33.1	66	23	3.17	1.5	5.1	[2]	1
December	40.6	22.7	56	8	3.26	.8	6.0	7	3
Year	61.9	40.8	[4] 95	[5] 0	40.08	33.7	47.8	30	3

[1] Record, 1958–69.
[2] Less than 0.5 day.
[3] Trace.
[4] Average annual maximum.
[5] Average annual minimum.

adjacent to Baltimore City and the Bay, the number is less, averaging between 100 and 110 days.

Freeze data are shown in table 12 for the weather stations at Parkton and at Towson. The growing season, often defined as the period between the last frost or 32°F. temperature in the spring and the first in the fall, averages 169 days at Parkton and 183 days at Towson; near the Bay and its estuaries it is likely to average 200 days.

The annual precipitation is 40 to 44 inches. The monthly distribution is fairly uniform through the year with a slight maximum in August. Most precipitation in the colder half of the years is the result of low pressure systems moving northeastward along the coast; in summer it occurs in showers and thunderstorms. Annual snowfall has averaged 39 inches at Parkton during the winter seasons 1953–1954 to 1969–1970; however in much of the county, particularly in southern areas, the seasonal average is 20 to 25 inches. Based on records at Woodstock, the weather station with the longest record in the county, the heaviest one-day snowfall was 23 inches on March 29, 1942.

Drought can occur in any month or season, but serious drought is most likely to occur in the summer. Generally, the rainfall and the stored soil moisture is adequate for good crop yields; however, the unequal distribution of summer showers and occasional dry periods at critical stages in crop development can make irrigation necessary for maximum crop yields in some years.

Prevailing winds are from the west-northwest to northwest except during the months May through September when they become southerly. The average wind speed is 10 miles per hour; winds, however, may reach 50 and 60 miles per hour and even higher in severe summer thunderstorms or intense winter storms. Damaging or dangerous storms, such as tornadoes, hurricanes, and blizzards are rare. Thunderstorms occur on an average of 30 days per year; almost 75 percent occur during the period May through August.

Farming

The 1964 U.S. Census of Agriculture shows that 133,198 acres is in farms in Baltimore County. This included 66,939 acres of cropland, 33,379 acres of pasture, and 159,000 acres of woodland. Farming is highly diversified. Grain for cash, dairying, beef cattle, horse breeding, vegetables, fruit, poultry, nursery and greenhouse products, and forest products all contribute to agricultural income. The value of all livestock and livestock products sold in 1964 was $6,431,182. The value of all crops sold that year was $5,332,397 (*3*).

The number of farms in the county has decreased steadily from 4,496 in 1900 to 1,361 in 1960. Over the same period the average size of farms increased from 75 acres to 110 acres. Total land in farms decreased from 340,206 acres in 1900 to 149,856 in 1960, and 133,198 in 1964. Numbers of livestock and acres in crops have generally decreased. The most important cash crops are wheat, corn, and barley (*6*).

Yield per acre of most crops, as well as milk per cow, has steadily increased over the years. Baltimore ranks first among Maryland counties in total vegetable production, first in sale of nursery and greenhouse products, and second in the sale of market eggs.

TABLE 12.—*Probabilities of last freezing temperatures in spring and first in fall*

[Data for period of spring 1953 through fall 1959 from Parkton, Md.; data for fall 1948, fall 1965, and spring 1970 from Towson, Md.]

Probability	Dates for given probability and temperature					
	32° F. or lower		24° F. or lower		16° F. or lower	
	Parkton	Towson	Parkton	Towson	Parkton	Towson
Spring:						
9 years in 10 later than	April 9	April 1	March 19	March 11	February 28	February 4
3 years in 4 later than	April 16	April 8	March 25	March 17	March 6	February 12
2 years in 3 later than	April 19	April 11	March 28	March 19	March 8	February 15
1 year in 2 later than	April 25	April 17	April 1	March 23	March 13	February 21
1 year in 3 later than	May 1	April 23	April 5	March 27	March 18	February 27
1 year in 4 later than	May 4	April 26	April 8	March 29	March 20	March 2
1 year in 10 later than	May 11	May 3	April 14	April 4	March 26	March 10
Fall:						
1 year in 10 earlier than	September 29	October 3	October 31	October 31	November 26	November 26
1 year in 4 earlier than	October 5	October 10	November 5	November 7	November 28	December 2
1 year in 3 earlier than	October 7	October 13	November 7	November 9	December 1	December 5
1 year in 2 earlier than	October 12	October 18	November 11	November 14	December 3	December 9
2 years in 3 earlier than	October 17	October 23	November 15	November 19	December 5	December 13
3 years in 4 earlier than	October 19	October 26	November 17	November 21	December 7	December 16
9 years in 10 earlier than	October 25	November 2	November 22	November 28	December 10	December 22

Water Supply

The public water system in Baltimore County is part of a regional system operated by the City of Baltimore. Three large reservoirs are the primary water sources for the system: Liberty Reservoir, Loch Raven Reservoir, and Pretty Boy Reservoir. Montebello Reservoir in Baltimore City is supplied by a pipeline from the Susquehanna River, outside of Baltimore County. There are many smaller reservoirs for small industries and institutions, and for private water supplies.

Rural areas depend largely on deep wells, but to some degree on streams, springs, and artificial ponds. Water supplies in the county are usually adequate, except locally during prolonged dry periods.

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Glossary

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Bedding. Plowing, grading, or otherwise elevating the surface of a flat field into a series of broad beds or "lands," so as to leave shallow surface drains between the beds.

Channery soil. A soil that contains thin, flat fragments of sandstone, limestone, or schist, as much as 6 inches in length along the longer axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky. When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Contour farming. plowing, cultivating, planting, and harvesting in rows that are at right angles to the natural direction of the slope or that are parallel to terrace grade.

Contour stripcropping. Growing crops in strips that follow the contour or are parallel to terraces or diversions. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Cover crop. A close-growing crop grown primarily to improve and to protect the soil between periods of regular crop production; or a crop grown between trees and vines in orchards and vineyards.

Depth, soil. In this survey the following verbal descriptions are used for the corresponding numerical range:

Very shallow.—10 inches or less.
Shallow.—10 to 20 inches.
Moderately deep.—20 to 40 inches.
Deep.—40 inches or more.

Diversion, or diversion terrace. A ridge of earth, generally a terrace, that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic-matter content and clay but is rich in silt or very fine sand. The layer is seemingly cemented. When dry, it is hard or very hard and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Leaching. The removal of the soluble materials from soils or other material by percolating water.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are these: *fine*, less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium*, ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse*, more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

pH value. A numerical means for designating acidity and alkalinity in soils. A pH value of 7.0 indicates precise neutrality, a higher value, alkalinity; and a lower value, acidity.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains

consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; houghly, the part of the solum below plow depth.

Topsoil. A presumed fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Weathering. All physical and chemical changes produced in rocks at or near the earth's surface by atmospheric agents. These changes result in more or less complete disintegration and decomposition of the rock.

U. S. DEPARTMENT OF AGRICULTURE

Washington, D. C. 20250

Soil Survey of Baltimore County, Maryland

E R R A T U M

Page 116, right-hand column, first paragraph, sixth line should read as follows: Ratings of permeability in inches per hour are very slow or slow, less than 0.20; moderately slow, 0.20-0.63; moderate, 0.63-2.0; moderately rapid, 2.0-6.3; and rapid or very rapid, more than 6.3.

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If you wish to file an employment complaint, you must contact your agency's EEO Counselor (http://directives.sc.egov.usda.gov/33081.wba) within 45 days of the date of the alleged discriminatory act, event, or personnel action. Additional information can be found online at http://www.ascr.usda.gov/complaint_filing_file.html.

To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for

program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

Supplemental Nutrition Assistance Program

For additional information dealing with Supplemental Nutrition Assistance Program (SNAP) issues, call either the USDA SNAP Hotline Number at (800) 221-5689, which is also in Spanish, or the State Information/Hotline Numbers (http://directives.sc.egov.usda.gov/33085.wba).

All Other Inquiries

For information not pertaining to civil rights, please refer to the listing of the USDA Agencies and Offices (http://directives.sc.egov.usda.gov/33086.wba).

P E N N S Y L V A N I A

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
MARYLAND AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

BALTIMORE COUNTY, MARYLAND

Scale 1:63360

1 0 1 2 3 4 Miles

N

YORK COUNTY
MASON AND DIXON LINE
Maryland Line
CARROLL COUNTY
HARFORD COUNTY
BALTIMORE COUNTY
ANNE ARUNDEL COUNTY
HOWARD COUNTY
PRETTYBOY RESERVOIR
LIBERTY RESERVOIR
LOCH RAVEN RESERVOIR
PATAPSCO RIVER
BACK RIVER
BIRD RIVER
GUNPOWDER RIVER
MIDDLE RIVER
CHESAPEAKE BAY
Parkton
White Hall
Hereford
Monkton
Glencoe
Arcadia (Upperco P O)
Fowblesburg
Butler
Phoenix
Jacksonville
Reisterstown
Cockeysville
Paulonia
Timonium
Kingsville
Bradshaw
Loceley
Brooklandville
Lutherville
Owings Mills
TOWSON
Perry Hall
White Marsh
Holbrook
Rodgers Forge
Parkville
Pikesville
Randallstown
Overlea
Middle River
Rosedale
Essex
Carroll Island
Granite
Lochearn
Woodlawn
BALTIMORE CITY
Catonsville
Dundalk
Edgemere
Miller Island
Hart Island
Sparrows Point
Halethorpe
Lansdowne
NORTHWEST HARBOR
PATAPSCO
OLD ROAD BAY
SHALLOW CREEK
BEAR CREEK
SUE CREEK
FRANCIS CREEK
SALTPETER CREEK
SENECA CREEK
FROG MORTAR CR
HUNTER CREEK
BALTIMORE BELTWAY
BALTIMORE WASHINGTON BLVD
BALTIMORE GENERAL PULASKI HIGHWAY
BALTIMORE NATIONAL HIGHWAY
BALTIMORE CENTRAL
PENN CENTRAL
B & O
MARYLAND WESTERN
WESTERN RUN
GUNPOWDER FALLS
PATAPSCO RIVER
NORTH BRANCH PATAPSCO RIVER
GUNPOWDER RIVER
76°20'
76°30'
76°40'
76°50'
39°40'
39°30'
39°20'

SOIL ASSOCIATIONS

1 Chester-Glenelg association: Dominantly gently sloping to moderately steep, deep, well-drained soils that have a subsoil of silt loam to light silty clay loam; underlain by acid crystalline rock; on uplands

2 Manor-Glenelg association: Gently sloping to very steep, deep, well-drained and somewhat excessively drained soils that have a subsoil of loam to light silty clay loam; underlain by acid crystalline rock; on uplands

3 Baltimore-Conestoga-Hagerstown association: Dominantly level to moderately sloping, deep, well-drained soils that have a subsoil of clay loam to clay; underlain by limestone, marble, or calciferous schist; in valleys

4 Chrome-Watchung association: Dominantly sloping to steep, shallow, well-drained soils that have a subsoil of silty clay loam and level to gently sloping, poorly drained soils that have a subsoil of silty clay; underlain by basic rock; on uplands

5 Legore-Aldino-Neshaminy association: Gently sloping to steep, deep, well-drained soils that have a subsoil of silty clay loam or clay loam and level to moderately sloping, moderately well drained soils that have a subsoil of silty clay loam and a fragipan; underlain by basic rock; on uplands

6 Beltsville-Chillum-Sassafras association: Level to moderately sloping, moderately well drained soils that have a subsoil of silt loam or silty clay loam and a fragipan, and well-drained soils that have a subsoil of sandy clay loam to silt loam; underlain by thick stratified sediment; on uplands

7 Loamy and clayey land-Lenoir-Beltsville association: Nearly level to steep land of sandy loam to clay loam over clay and somewhat poorly drained and moderately well drained soils that have a subsoil of dominantly silty clay loam and silt loam; underlain by thick stratified sediment; on uplands

8 Sassafras-Woodstown-Fallsington association: Well drained, moderately well drained, and poorly drained soils that have a subsoil of sandy clay loam; underlain by thick stratified sediment; on uplands

9 Mattapex-Barclay-Othello association: Moderately well drained, somewhat poorly drained, and poorly drained soils that have a subsoil of silt loam or silty clay loam; underlain by thick stratified sediment; on uplands

Compiled 1973

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

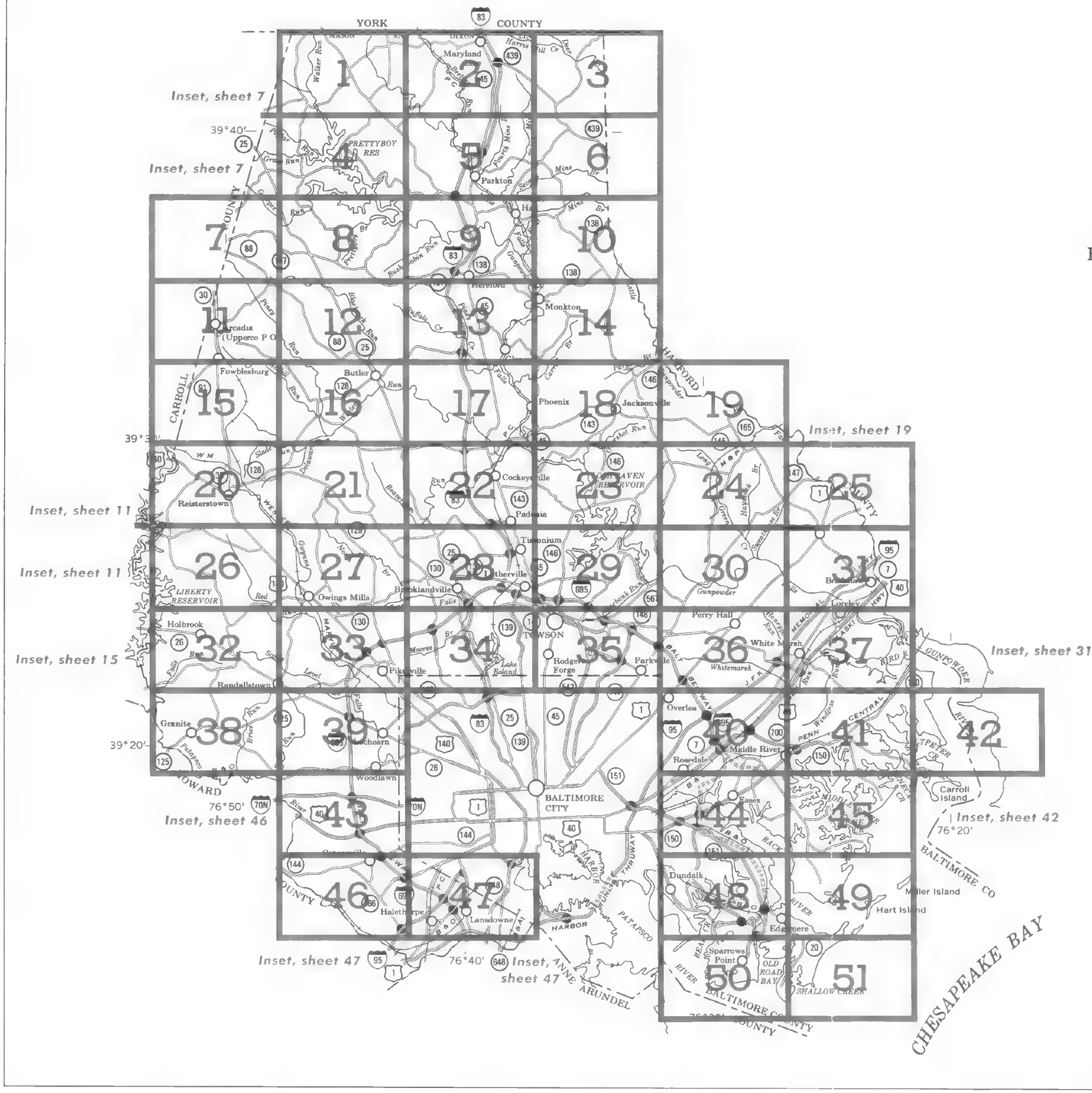
INDEX TO MAP SHEETS

BALTIMORE COUNTY, MARYLAND

Scale 1:253,440

1 0 1 2 3 4 Miles

N



GUIDE TO MAPPING UNITS

For a complete description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. The suitability of the soils for use as cropland is discussed in the soil descriptions. The capability classification is discussed on pages 60 to 63. Dashes in capability unit and woodland subclass columns mean that the soil is too variable for grouping. Other information is given in tables as follows:

Acreage and extent, table 1, p. 8.
Estimated yields of specified crops, table 2, p. 64.
Woodland management, table 3, p. 70.

Suitability of soils for wildlife, table 4, p. 88.
Engineering uses of the soils, tables 5 and 6, pp. 94 through 115.

Map symbol	Mapping unit	Described on page	Capability unit	Woodland subclass	
			Symbol	Symbol	Page
AdA	Aldino silt loam, 0 to 3 percent slopes	11	IIw-2	3o	83
AdB2	Aldino silt loam, 3 to 8 percent slopes, moderately eroded	11	IIe-14	3o	83
AdC2	Aldino silt loam, 8 to 15 percent slopes, moderately eroded	11	IIIe-14	3r	83
AsC	Aldino very stony silt loam, 0 to 15 percent slopes	11	VIs-3	3r	83
AuB	Aldino-Urban land complex, 0 to 8 percent slopes	11	-------	--	--
Av	Alluvial land	11	VIw-1	2w	82
BaA	Baile silt loam, 0 to 3 percent slopes	13	Vw-1	1w	80
BaB	Baile silt loam, 3 to 8 percent slopes	13	VIw-2	1w	80
BmA	Baltimore silt loam, 0 to 3 percent slopes	13	I-1	1o	80
BmB2	Baltimore silt loam, 3 to 8 percent slopes, moderately eroded	13	IIe-1	1o	80
BmC2	Baltimore silt loam, 8 to 15 percent slopes, moderately eroded	13	IIIe-1	1o	80
BnB	Baltimore-Urban land complex, 0 to 8 percent slopes	14	-------	--	--
Br	Barclay silt loam	14	IIIw-1	2w	82
BtA	Beltsville silt loam, 0 to 2 percent slopes	15	IIw-8	3w	84
BtB	Beltsville silt loam, 2 to 5 percent slopes	15	IIe-13	3w	84
BtC2	Beltsville silt loam, 5 to 10 percent slopes, moderately eroded	15	IIIe-13	3w	84
BuB	Beltsville-Urban land complex, 0 to 5 percent slopes	15	-------	--	--
BuC	Beltsville-Urban land complex, 5 to 10 percent slopes	16	-------	--	--
BwB2	Brandywine loam, 3 to 8 percent slopes, moderately eroded	16	IIe-10	3f	84
BwC2	Brandywine loam, 8 to 15 percent slopes, moderately eroded	16	IIIe-10	3f	84
ByD2	Brandywine gravelly loam, 15 to 25 percent slopes, moderately eroded	16	IVe-10	3f	84
ByD3	Brandywine gravelly loam, 15 to 25 percent slopes, severely eroded	17	VIe-3	3f	84
ByE	Brandywine gravelly loam, 25 to 45 percent slopes	17	VIe-3	3f	84
CaA	Captina silt loam, 0 to 3 percent slopes	17	IIw-1	3w	84
CaB2	Captina silt loam, 3 to 8 percent slopes, moderately eroded	17	IIe-16	3w	84
CcA	Chester silt loam, 0 to 3 percent slopes	18	I-4	2o	81
CcB2	Chester silt loam, 3 to 8 percent slopes, moderately eroded	18	IIe-4	2o	81
CcC2	Chester silt loam, 8 to 15 percent slopes, moderately eroded	18	IIIe-4	2o	81
CgB2	Chester gravelly silt loam, 3 to 8 percent slopes, moderately eroded	18	IIe-4	2o	81
CgC2	Chester gravelly silt loam, 8 to 15 percent slopes, moderately eroded	18	IIIe-4	2o	81
ChB2	Chillum silt loam, 2 to 5 percent slopes, moderately eroded	19	IIs-7	3o	83
ChC2	Chillum silt loam, 5 to 10 percent slopes, moderately eroded	19	IIIe-7	3o	83
ChC3	Chillum silt loam, 5 to 10 percent slopes, severely eroded	19	IVe-7	3o	83
CkB2	Chillum-Neshaminy silt loams, 2 to 5 percent slopes, moderately eroded	19	IIs-7	3o	83
CkC2	Chillum-Neshaminy silt loams, 5 to 10 percent slopes, moderately eroded	19	IIIe-7	3o	83
CkD2	Chillum-Neshaminy gravelly silt loams, 10 to 15 percent slopes, moderately eroded	19	IVe-7	3o	83
ClB	Chillum-Urban land complex, 0 to 5 percent slopes	20	-------	--	--
ClD	Chillum-Urban land complex, 5 to 15 percent slopes	20	-------	--	--
CmB	Christiana loam, 2 to 5 percent slopes	21	IIe-42	3c	84
CmC2	Christiana loam, 5 to 10 percent slopes, moderately eroded	21	IIIe-42	3c	84
CnB2	Chrome silt loam, 3 to 8 percent slopes, moderately eroded	21	IIe-10	4c	85
CoC3	Chrome channery silty clay loam, 3 to 15 percent slopes, severely eroded	21	VIs-32	6d	86
CoE3	Chrome channery silty clay loam, 15 to 45 percent slopes, severely eroded	21	VIIs-32	6d	86
Cp	Clay pits	22	VIIIs-4	--	--
Ct	Coastal beaches	22	VIIIs-2	--	--
Cu	Codorus silt loam	22	IIw-7	1w	80
Cv	Comus silt loam	23	I-6	1o	80
CwB2	Conestoga loam, 3 to 8 percent slopes, moderately eroded	24	IIe-24	1o	80
CwC2	Conestoga loam, 8 to 15 percent slopes, moderately eroded	24	IIIe-24	1r	80
DcB	Delanco silt loam, 3 to 8 percent slopes	24	IIe-16	2o	81
Du	Dunning silt loam	25	IVw-3	1w	80
EdB2	Edgemont gravelly loam, 3 to 8 percent slopes, moderately eroded	26	IIe-4	3o	83
EdC2	Edgemont gravelly loam, 8 to 15 percent slopes, moderately eroded	26	IIIe-4	3o	83
EgD	Edgemont very stony loam, 8 to 25 percent slopes	26	VIs-3	2r-3r	81-83
EgE	Edgemont very stony loam, 25 to 45 percent slopes	26	VIIs-3	2r-3r	81-83
EhB2	Elioak silt loam, 3 to 8 percent slopes, moderately eroded	27	IIe-4	2c	82
EhC2	Elioak silt loam, 8 to 15 percent slopes, moderately eroded	27	IIIe-4	2c	82
EkB2	Elioak gravelly silt loam, 3 to 8 percent slopes, moderately eroded	27	IIe-4	2c	82
EkC2	Elioak gravelly silt loam, 8 to 15 percent slopes, moderately eroded	27	IIIe-4	2c	82
ElC3	Elioak silty clay loam, 8 to 15 percent slopes, severely eroded	27	IVe-3	2c	82
Em	Elkton loam	28	IIIw-9	3w	84
En	Elkton silt loam	28	IIIw-9	3w	84
Eo	Elkton-Urban land complex	28	-------	--	--
EsB	Elsinboro loam, 3 to 8 percent slopes	29	IIe-4	2o	81
EsC2	Elsinboro loam, 8 to 15 percent slopes, moderately eroded	29	IIIe-4	2o	81
Fa	Fallsington sandy loam	29	IIIw-6	2w	82
Fs	Fallsington loam	29	IIIw-7	2w	82
FtB	Fort Mott loamy sand, 0 to 5 percent slopes	30	IIs-4	3o	83
GaB	Galestown loamy sand, 0 to 5 percent slopes	31	IIIs-1	3s	84
GaC	Galestown loamy sand, 5 to 10 percent slopes	31	IVs-1	3s	84
GcB2	Glenelg loam, 3 to 8 percent slopes, moderately eroded	31	IIe-4	2o	81
GcC2	Glenelg loam, 8 to 15 percent slopes, moderately eroded	31	IIIe-4	2o	81
GcC3	Glenelg loam, 8 to 15 percent slopes, severely eroded	31	IVe-3	2o	81
GsD2	Glenelg loam, 15 to 25 percent slopes, moderately eroded	32	IVe-3	2r	81
GcD3	Glenelg loam, 15 to 25 percent slopes, severely eroded	32	VIe-3	2r	81
GgB2	Glenelg channery loam, 3 to 8 percent slopes, moderately eroded	32	IIe-4	2o	81
GgC2	Glenelg channery loam, 8 to 15 percent slopes, moderately eroded	32	IIIe-4	2o	81
GgD2	Glenelg channery loam, 15 to 25 percent slopes, moderately eroded	32	IVe-3	2r	81
GgD3	Glenelg channery loam, 15 to 25 percent slopes, severely eroded	32	VIe-3	2r	81
GlB	Glenelg-Urban land complex, 0 to 8 percent slopes	32	------	--	--
GlC	Glenelg-Urban land complex, 8 to 15 percent slopes	32	------	--	--
GnA	Glenville silt loam, 0 to 3 percent slopes	33	IIw-1	2w	82
GnB	Glenville silt loam, 3 to 8 percent slopes	33	IIe-16	2w	82
GuB	Glenville-Urban land complex, 0 to 8 percent slopes	33	------	--	--
HaA	Hagerstown silt loam, 0 to 3 percent slopes	34	I-1	1c	81
HaB2	Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded	34	IIe-1	1c	81
HaC2	Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded	34	IIIe-1	1c	81
Hb	Hatboro silt loam	36	IIIw-7	2w	82
HoB2	Hollinger loam, 3 to 8 percent slopes, moderately eroded	37	IIe-25	2o	81
HoC2	Hollinger loam, 8 to 15 percent slopes, moderately eroded	37	IIIe-25	2r	81
HrD3	Hollinger and Conestoga loams, 15 to 25 percent slopes, severely eroded	37	VIe-3	2r	81

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Map symbol	Mapping unit	Described on page	Capability unit	Woodland subclass	
			Symbol	Symbol	Page
HsC	Hollinger and Conestoga very rocky loams, 3 to 15 percent slopes-	37	VIs-2	2r	81
Iu	Iuka silt loam----------	38	IIw-7	1o	80
JpB	Joppa gravelly sandy loam, 2 to 5 percent slopes----------	39	IIs-4	3f	84
JpC2	Joppa gravelly sandy loam, 5 to 10 percent slopes, moderately eroded----------	39	IIIe-33	3f	84
JpD2	Joppa gravelly sandy loam, 10 to 15 percent slopes, moderately eroded----------	39	IVe-5	3f	84
JuD	Joppa-Urban land complex, 5 to 15 percent slopes----------	39	------	--	--
KeB2	Kelly silt loam, 3 to 8 percent slopes, moderately eroded--------	40	IVw-3	4w	84
KeC2	Kelly silt loam, 8 to 15 percent slopes, moderately eroded-------	40	IVw-3	4w	84
KsC	Kelly very stony silt loam, 0 to 15 percent slopes----------	40	VIIs-4	4w	84
KuB	Kelly-Urban land complex, 0 to 8 percent slopes----------	40	------	--	--
LeB2	Legore silt loam, 3 to 8 percent slopes, moderately eroded--------	41	IIe-10	2o	81
LeC2	Legore silt loam, 8 to 15 percent slopes, moderately eroded------	41	IIIe-10	2o	81
LeD2	Legore silt loam, 15 to 25 percent slopes, moderately eroded-----	41	IVe-10	2r	81
LeE	Legore silt loam, 25 to 45 percent slopes----------	41	VIe-3	2r	81
LfC	Legore very stony silt loam, 3 to 15 percent slopes----------	41	VIs-3	2o	81
LfD	Legore very stony silt loam, 15 to 25 percent slopes----------	41	VIs-3	2r	81
LfE	Legore very stony silt loam, 25 to 45 percent slopes----------	41	VIIs-3	2r	81
LgC3	Legore silty clay loam, 8 to 15 percent slopes, severely eroded--	41	IVe-10	2o	81
LgD3	Legore silty clay loam, 15 to 25 percent slopes, severely eroded-	41	VIe-3	2r	81
LhB	Legore-Urban land complex, 0 to 8 percent slopes----------	41	------	--	--
LhC	Legore-Urban land complex, 8 to 15 percent slopes----------	42	------	--	--
LlB	Lenoir loam, 0 to 5 percent slopes----------	43	IIIw-5	3w	84
LmB	Lenoir silt loam, 0 to 5 percent slopes----------	43	IIIw-5	3w	84
LmC2	Lenoir silt loam, 5 to 12 percent slopes, moderately eroded------	43	IIIe-34	3w	84
LnC3	Lenoir silty clay loam, 5 to 12 percent slopes, severely eroded--	43	IVe-9	3w	84
LoB	Lenoir-Urban land complex, 0 to 5 percent slopes----------	43	------	--	--
Lr	Leonardtown silt loam----------	44	IVw-3	3w	84
Ls	Lindside silt loam----------	45	IIw-7	1w	80
LyB	Loamy and clayey land, 0 to 5 percent slopes----------	45	IIIe-42	3c	84
LyD	Loamy and clayey land, 5 to 15 percent slopes----------	45	VIe-2	3c	84
LyE	Loamy and clayey land, 15 to 40 percent slopes----------	45	VIIe-2	3c	84
Ma	Made land----------	45	------	--	--
MbB2	Manor loam, 3 to 8 percent slopes, moderately eroded----------	46	IIe-25	2o	81
MbC2	Manor loam, 8 to 15 percent slopes, moderately eroded----------	46	IIIe-25	2r	81
MbC3	Manor loam, 8 to 15 percent slopes, severely eroded----------	46	IVe-25	2r	81
MbD2	Manor loam, 15 to 25 percent slopes, moderately eroded----------	46	IVe-25	2r	81
MbD3	Manor loam, 15 to 25 percent slopes, severely eroded----------	46	VIe-3	2r	81
McB2	Manor channery loam, 3 to 8 percent slopes, moderately eroded----	46	IIe-25	2o	81
McC2	Manor channery loam, 8 to 15 percent slopes, moderately eroded---	46	IIIe-25	2r	81
McC3	Manor channery loam, 8 to 15 percent slopes, severely eroded-----	46	IVe-25	2r	81
McD2	Manor channery loam, 15 to 25 percent slopes, moderately eroded--	47	IVe-25	2r	81
McD3	Manor channery loam, 15 to 25 percent slopes, severely eroded----	47	VIe-3	2r	81
MdE	Manor soils, 25 to 50 percent slopes----------	47	VIe-3	2r	81
MeD	Manor-Urban land complex, 15 to 25 percent slopes----------	47	------	--	--
MgC	Manor and Glenelg very stony loams, 3 to 15 percent slopes-------	47	VIs-3	2r	81
MhD	Manor and Brandywine very stony loams, 15 to 25 percent slopes---	47	VIs-3	2r	81
MhE	Manor and Brandywine very stony loams, 25 to 65 percent slopes---	47	VIIs-3	2r	81
MkA	Matapeake silt loam, 0 to 2 percent slopes----------	48	I-4	3o	83
MkB	Matapeake silt loam, 2 to 5 percent slopes----------	48	IIe-4	3o	83
MkC2	Matapeake silt loam, 5 to 12 percent slopes, moderately eroded-----	48	IIIe-4	3o	83
MlA	Mattapex silt loam, 0 to 2 percent slopes----------	49	IIw-1	3o	83
MlB	Mattapex silt loam, 2 to 5 percent slopes----------	49	IIe-16	3o	83
MmB	Mattapex-Urban land complex, 0 to 5 percent slopes----------	49	------	--	--
Mn	Melvin silt loam----------	50	IIIw-3	1w	80
Mo	Melvin silt loam, local alluvium----------	50	IIIw-3	1w	80
Mr	Mine dumps and quarries----------	50	VIIIs-4	--	--
MsB2	Montalto silt loam, 3 to 8 percent slopes, moderately eroded-------	51	IIe-4	2c	82
MsC2	Montalto silt loam, 8 to 15 percent slopes, moderately eroded------	51	IIIe-4	2c	82
MtB2	Mt. Airy channery loam, 3 to 8 percent slopes, moderately eroded---	52	IIIe-10	3f	84
MtC2	Mt. Airy channery loam, 8 to 15 percent slopes, moderately eroded----------	52	IVe-10	3f	84
MtD2	Mt. Airy channery loam, 15 to 25 percent slopes, moderately eroded----------	52	VIe-3	3f	84
MtD3	Mt. Airy channery loam, 15 to 25 percent slopes, severely eroded---	52	VIIe-3	3f	84
NeB2	Neshaminy silt loam, 3 to 8 percent slopes, moderately eroded------	52	IIe-4	2o	81
NeC2	Neshaminy silt loam, 8 to 15 percent slopes, moderately eroded-----	52	IIIe-4	2o	81
Ot	Othello silt loam----------	54	IIIw-7	3w	83
Po	Pocomoke sandy loam----------	54	IIIw-6	2w	82
ReC2	Relay silt loam, 8 to 15 percent slopes, moderately eroded---------	55	IIIe-10	2o	81
ReD2	Relay silt loam, 15 to 25 percent slopes, moderately eroded--------	55	IVe-10	2r	81
RsD	Relay very stony silt loam, 3 to 25 percent slopes----------	55	VIs-3	2r	81
RsE	Relay very stony silt loam, 25 to 65 percent slopes----------	55	VIIs-3	2r	81
RyD3	Relay clay loam, 15 to 25 percent slopes, severely eroded----------	55	VIe-3	2r	81
Sg	Sand and gravel pits----------	55	VIIIs-4	--	--
ShA	Sassafras sandy loam, 0 to 2 percent slopes----------	56	I-5	3o	83
ShB	Sassafras sandy loam, 2 to 5 percent slopes----------	56	IIe-5	3o	83
ShC2	Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded----	56	IIIe-5	3o	83
ShC3	Sassafras sandy loam, 5 to 10 percent slopes, severely eroded------	56	IVe-5	3o	83
ShD2	Sassafras sandy loam, 10 to 15 percent slopes, moderately eroded---	56	IVe-5	3o	83
SlA	Sassafras loam, 0 to 2 percent slopes----------	56	I-4	3o	83
SlB	Sassafras loam, 2 to 5 percent slopes----------	57	IIe-4	3o	83
SlC2	Sassafras loam, 5 to 10 percent slopes, moderately eroded----------	57	IIIe-4	3o	83
SnB	Sassafras-Urban land complex, 0 to 5 percent slopes----------	57	------	--	--
SsD3	Sassafras and Joppa soils, 5 to 15 percent slopes, severely eroded----------	57	VIe-2	3o	83
SsE	Sassafras and Joppa soils, 15 to 30 percent slopes----------	57	VIe-2	3r	83
St	Stony land, steep----------	57	VIIIs-1	5x	85
SuB2	Sunnyside fine sandy loam, 0 to 5 percent slopes, moderately eroded----------	58	IIe-5	2o	81
Sw	Swamp----------	58	VIIw-1	--	--
Tm	Tidal marsh----------	58	VIIIw-1	--	--
WaA	Watchung silt loam, 0 to 3 percent slopes----------	59	Vw-1	1w	80
WaB	Watchung silt loam, 3 to 8 percent slopes----------	59	VIw-2	1w	80
WcB	Watchung very stony silt loam, 0 to 8 percent slopes----------	59	VIIs-4	1w	80
WdA	Woodstown sandy loam, 0 to 2 percent slopes----------	60	IIw-5	2o	81
WdB	Woodstown sandy loam, 2 to 5 percent slopes----------	60	IIe-36	2o	81
WoA	Woodstown loam, 0 to 2 percent slopes----------	60	IIw-1	2o	81
WoB	Woodstown loam, 2 to 5 percent slopes----------	60	IIe-16	2o	81

463-161 O - 76 (Face map) No. 1

SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, A, B, C, D, or E, shows the slope. Most symbols without a slope letter are those of nearly level soils, but some are for land types that have a considerable range of slope. A final number, 2 or 3, in the symbol shows that the soil is moderately eroded or severely eroded.

SYMBOL	NAME
AdA	Aldino silt loam, 0 to 3 percent slopes
AdB2	Aldino silt loam, 3 to 8 percent slopes, moderately eroded
AdC2	Aldino silt loam, 8 to 15 percent slopes, moderately eroded
AsC	Aldino very stony silt loam, 0 to 15 percent slopes
AuB	Aldino-Urban land complex, 0 to 8 percent slopes
Av	Alluvial land
BaA	Baile silt loam, 0 to 3 percent slopes
BaB	Baile silt loam, 3 to 8 percent slopes
BmA	Baltimore silt loam, 0 to 3 percent slopes
BmB2	Baltimore silt loam, 3 to 8 percent slopes, moderately eroded
BmC2	Baltimore silt loam, 8 to 15 percent slopes, moderately eroded
BnB	Baltimore-Urban land complex, 0 to 8 percent slopes
Br	Barclay silt loam
BtA	Beltsville silt loam, 0 to 2 percent slopes
BtB	Beltsville silt loam, 2 to 5 percent slopes
BtC2	Beltsville silt loam, 5 to 10 percent slopes, moderately eroded
BuB	Beltsville-Urban land complex, 0 to 5 percent slopes
BuC	Beltsville-Urban land complex, 5 to 10 percent slopes
BwB2	Brandywine loam, 3 to 8 percent slopes, moderately eroded
BwC2	Brandywine loam, 8 to 15 percent slopes, moderately eroded
ByD2	Brandywine gravelly loam, 15 to 25 percent slopes, moderately eroded
ByD3	Brandywine gravelly loam, 15 to 25 percent slopes, severely eroded
ByE	Brandywine gravelly loam, 25 to 45 percent slopes
CaA	Captina silt loam, 0 to 3 percent slopes
CaB2	Captina silt loam, 3 to 8 percent slopes, moderately eroded
CcA	Chester silt loam, 0 to 3 percent slopes
CcB2	Chester silt loam, 3 to 8 percent slopes, moderately eroded
CcC2	Chester silt loam, 8 to 15 percent slopes, moderately eroded
CgB2	Chester gravelly silt loam, 3 to 8 percent slopes, moderately eroded
CgC2	Chester gravelly silt loam, 8 to 15 percent slopes, moderately eroded
ChB2	Chillum silt loam, 2 to 5 percent slopes, moderately eroded
ChC2	Chillum silt loam, 5 to 10 percent slopes, moderately eroded
ChC3	Chillum silt loam, 5 to 10 percent slopes, severely eroded
CkB2	Chillum-Neshaminy silt loams, 2 to 5 percent slopes, moderately eroded
CkC2	Chillum-Neshaminy silt loams, 5 to 10 percent slopes, moderately eroded
CkD2	Chillum-Neshaminy gravelly silt loams, 10 to 15 percent slopes, moderately eroded
CrB	Chillum-Urban land complex, 0 to 5 percent slopes
CrD	Chillum-Urban land complex, 5 to 15 percent slopes
CmB	Christiana loam, 2 to 5 percent slopes
CmC2	Christiana loam, 5 to 10 percent slopes, moderately eroded
CnB2	Chrome silt loam, 3 to 8 percent slopes, moderately eroded
CoC3	Chrome channery silty clay loam, 3 to 15 percent slopes, severely eroded
CoE3	Chrome channery silty clay loam, 15 to 45 percent slopes, severely eroded
Cp	Clay pits
Ct	Coastal beaches
Cu	Codorus silt loam
Cv	Comus silt loam
CwB2	Conestoga loam, 3 to 8 percent slopes, moderately eroded
CwC2	Conestoga loam, 8 to 15 percent slopes, moderately eroded
DcB	Delanco silt loam, 3 to 8 percent slopes
Du	Dunning silt loam
EdB2	Edgemont gravelly loam, 3 to 8 percent slopes, moderately eroded
EdC2	Edgemont gravelly loam, 8 to 15 percent slopes, moderately eroded
EgD	Edgemont very stony loam, 8 to 25 percent slopes
EgE	Edgemont very stony loam, 25 to 45 percent slopes
EhB2	Elioak silt loam, 3 to 8 percent slopes, moderately eroded
EhC2	Elioak silt loam, 8 to 15 percent slopes, moderately eroded
EkB2	Elioak gravelly silt loam, 3 to 8 percent slopes, moderately eroded
EkC2	Elioak gravelly silt loam, 8 to 15 percent slopes, moderately eroded
ElC3	Elioak silty clay loam, 8 to 15 percent slopes, severely eroded
Em	Elkton loam
En	Elkton silt loam
Eo	Elkton-Urban land complex
EsB	Elsinboro loam, 3 to 8 percent slopes
EsC2	Elsinboro loam, 8 to 15 percent slopes, moderately eroded
Fa	Fallsington sandy loam
Fs	Fallsington loam
FtB	Fort Mott loamy sand, 0 to 5 percent slopes
GaB	Galestown loamy sand, 0 to 5 percent slopes
GaC	Galestown loamy sand, 5 to 10 percent slopes
GcB2	Glenelg loam, 3 to 8 percent slopes, moderately eroded
GcC2	Glenelg loam, 8 to 15 percent slopes, moderately eroded
GcC3	Glenelg loam, 8 to 15 percent slopes, severely eroded
GcD2	Glenelg loam, 15 to 25 percent slopes, moderately eroded
GcD3	Glenelg loam, 15 to 25 percent slopes, severely eroded
GgB2	Glenelg channery loam, 3 to 8 percent slopes, moderately eroded
GgC2	Glenelg channery loam, 8 to 15 percent slopes, moderately eroded
GgD2	Glenelg channery loam, 15 to 25 percent slopes, moderately eroded
GgD3	Glenelg channery loam, 15 to 25 percent slopes, severely eroded
GrB	Glenelg-Urban land complex, 0 to 8 percent slopes
GrC	Glenelg-Urban land complex, 8 to 15 percent slopes
GnA	Glenville silt loam, 0 to 3 percent slopes
GnB	Glenville silt loam, 3 to 8 percent slopes
GuB	Glenville-Urban land complex, 0 to 8 percent slopes
HaA	Hagerstown silt loam, 0 to 3 percent slopes
HaB2	Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded
HaC2	Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded
Hb	Hatboro silt loam
HoB2	Hollinger loam, 3 to 8 percent slopes, moderately eroded
HoC2	Hollinger loam, 8 to 15 percent slopes, moderately eroded
HrD3	Hollinger and Conestoga loams, 15 to 25 percent slopes, severely eroded
HsC	Hollinger and Conestoga very rocky loams, 3 to 15 percent slopes
Iu	Iuka silt loam
JpB	Joppa gravelly sandy loam, 2 to 5 percent slopes
JpC2	Joppa gravelly sandy loam, 5 to 10 percent slopes, moderately eroded
JpD2	Joppa gravelly sandy loam, 10 to 15 percent slopes, moderately eroded
JuD	Joppa-Urban land complex, 5 to 15 percent slopes
KeB2	Kelly silt loam, 3 to 8 percent slopes, moderately eroded
KeC2	Kelly silt loam, 8 to 15 percent slopes, moderately eroded
KsC	Kelly very stony silt loam, 0 to 15 percent slopes
KuB	Kelly-Urban land complex, 0 to 8 percent slopes
LeB2	Legore silt loam, 3 to 8 percent slopes, moderately eroded
LeC2	Legore silt loam, 8 to 15 percent slopes, moderately eroded
LeD2	Legore silt loam, 15 to 25 percent slopes, moderately eroded
LeE	Legore silt loam, 25 to 45 percent slopes
LfC	Legore very stony silt loam, 3 to 15 percent slopes
LfD	Legore very stony silt loam, 15 to 25 percent slopes
LfE	Legore very stony silt loam, 25 to 45 percent slopes
LgC3	Legore silty clay loam, 8 to 15 percent slopes, severely eroded
LgD3	Legore silty clay loam, 15 to 25 percent slopes, severely eroded
LhB	Legore-Urban land complex, 0 to 8 percent slopes
LhC	Legore-Urban land complex, 8 to 15 percent slopes
LlB	Lenoir loam, 0 to 5 percent slopes
LmB	Lenoir silt loam, 0 to 5 percent slopes
LmC2	Lenoir silt loam, 5 to 12 percent slopes, moderately eroded
LnC3	Lenoir silty clay loam, 5 to 12 percent slopes, severely eroded
LoB	Lenoir-Urban land complex, 0 to 5 percent slopes
Lr	Leonardtown silt loam
Ls	Lindside silt loam
LyB	Loamy and clayey land, 0 to 5 percent slopes
LyD	Loamy and clayey land, 5 to 15 percent slopes
LyE	Loamy and clayey land, 15 to 40 percent slopes
Ma	Made land
MbB2	Manor loam, 3 to 8 percent slopes, moderately eroded
MbC2	Manor loam, 8 to 15 percent slopes, moderately eroded
MbC3	Manor loam, 8 to 15 percent slopes, severely eroded
MbD2	Manor loam, 15 to 25 percent slopes, moderately eroded
MbD3	Manor loam, 15 to 25 percent slopes, severely eroded
McB2	Manor channery loam, 3 to 8 percent slopes, moderately eroded
McC2	Manor channery loam, 8 to 15 percent slopes, moderately eroded
McC3	Manor channery loam, 8 to 15 percent slopes, severely eroded
McD2	Manor channery loam, 15 to 25 percent slopes, moderately eroded
McD3	Manor channery loam, 15 to 25 percent slopes, severely eroded
MdE	Manor soils, 25 to 50 percent slopes
MeD	Manor-Urban land complex, 15 to 25 percent slopes
MgC	Manor and Glenelg very stony loams, 3 to 15 percent slopes
MhD	Manor and Brandywine very stony loams, 15 to 25 percent slopes
MhE	Manor and Brandywine very stony loams, 25 to 65 percent slopes
MkA	Matapeake silt loam, 0 to 2 percent slopes
MkB	Matapeake silt loam, 2 to 5 percent slopes
MkC2	Matapeake silt loam, 5 to 12 percent slopes, moderately eroded
MlA	Mattapex silt loam, 0 to 2 percent slopes
MlB	Mattapex silt loam, 2 to 5 percent slopes
MmB	Mattapex-Urban land complex, 0 to 5 percent slopes
Mn	Melvin silt loam
Mo	Melvin silt loam, local alluvium
Mr	Mine dumps and quarries
MsB2	Montalto silt loam, 3 to 8 percent slopes, moderately eroded
MsC2	Montalto silt loam, 8 to 15 percent slopes, moderately eroded
MtB2	Mt. Airy channery loam, 3 to 8 percent slopes, moderately eroded
MtC2	Mt. Airy channery loam, 8 to 15 percent slopes, moderately eroded
MtD2	Mt. Airy channery loam, 15 to 25 percent slopes, moderately eroded
MtD3	Mt. Airy channery loam, 15 to 25 percent slopes, severely eroded
NeB2	Neshaminy silt loam, 3 to 8 percent slopes, moderately eroded
NeC2	Neshaminy silt loam, 8 to 15 percent slopes, moderately eroded
Ot	Othello silt loam
Po	Pocomoke sandy loam
ReC2	Relay silt loam, 8 to 15 percent slopes, moderately eroded
ReD2	Relay silt loam, 15 to 25 percent slopes, moderately eroded
RsD	Relay very stony silt loam, 3 to 25 percent slopes
RsE	Relay very stony silt loam, 25 to 65 percent slopes
RyD3	Relay clay loam, 15 to 25 percent slopes, severely eroded
Sg	Sand and gravel pits
SnA	Sassafras sandy loam, 0 to 2 percent slopes
SnB	Sassafras sandy loam, 2 to 5 percent slopes
SnC2	Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded
SnC3	Sassafras sandy loam, 5 to 10 percent slopes, severely eroded
SnD2	Sassafras sandy loam, 10 to 15 percent slopes, moderately eroded
SlA	Sassafras loam, 0 to 2 percent slopes
SlB	Sassafras loam, 2 to 5 percent slopes
SlC2	Sassafras loam, 5 to 10 percent slopes, moderately eroded
SrB	Sassafras-Urban land complex, 0 to 5 percent slopes
SsD3	Sassafras and Joppa soils, 5 to 15 percent slopes, severely eroded
SsE	Sassafras and Joppa soils, 15 to 30 percent slopes
St	Stony land, steep
SuB2	Sunnyside fine sandy loam, 0 to 5 percent slopes, moderately eroded
Sw	Swamp
Tm	Tidal marsh
WaA	Watchung silt loam, 0 to 3 percent slopes
WaB	Watchung silt loam, 3 to 8 percent slopes
WcB	Watchung very stony silt loam, 0 to 8 percent slopes
WdA	Woodstown sandy loam, 0 to 2 percent slopes
WdB	Woodstown sandy loam, 2 to 5 percent slopes
WoA	Woodstown loam, 0 to 2 percent slopes
WoB	Woodstown loam, 2 to 5 percent slopes

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 1

BALTIMORE COUNTY, MARYLAND NO. 1

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station. Photobase from 1971 aerial photography. Positions of 5,000 foot grid ticks are approximate and based on the Maryland coordinate system

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 10

(10)

N

930 000 FEET

655 000 FEET

640 000 FEET

910 000 FEET

(Joins sheet 6)

(Joins sheet 9)

(Joins sheet 14)

HARFORD COUNTY

Scale 1:20 000

1 Mile

5 000 Feet

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

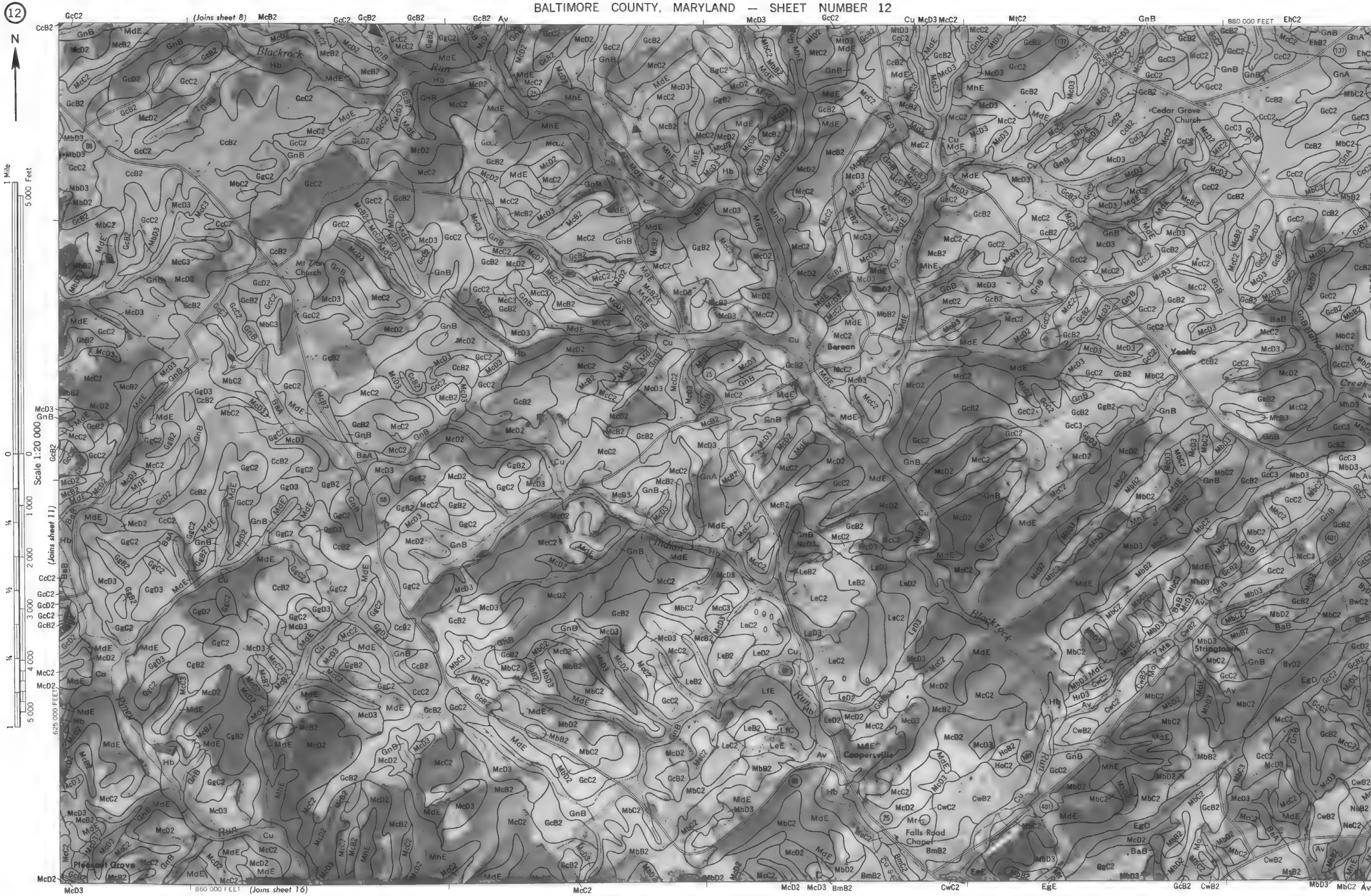
This map is one of a set compiled in 1973 as part of a soil survey by the U.S. Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

BALTIMORE COUNTY, MARYLAND — SHEET NO. 10

BALTIMORE COUNTY, MARYLAND NO. 11

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 12



Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

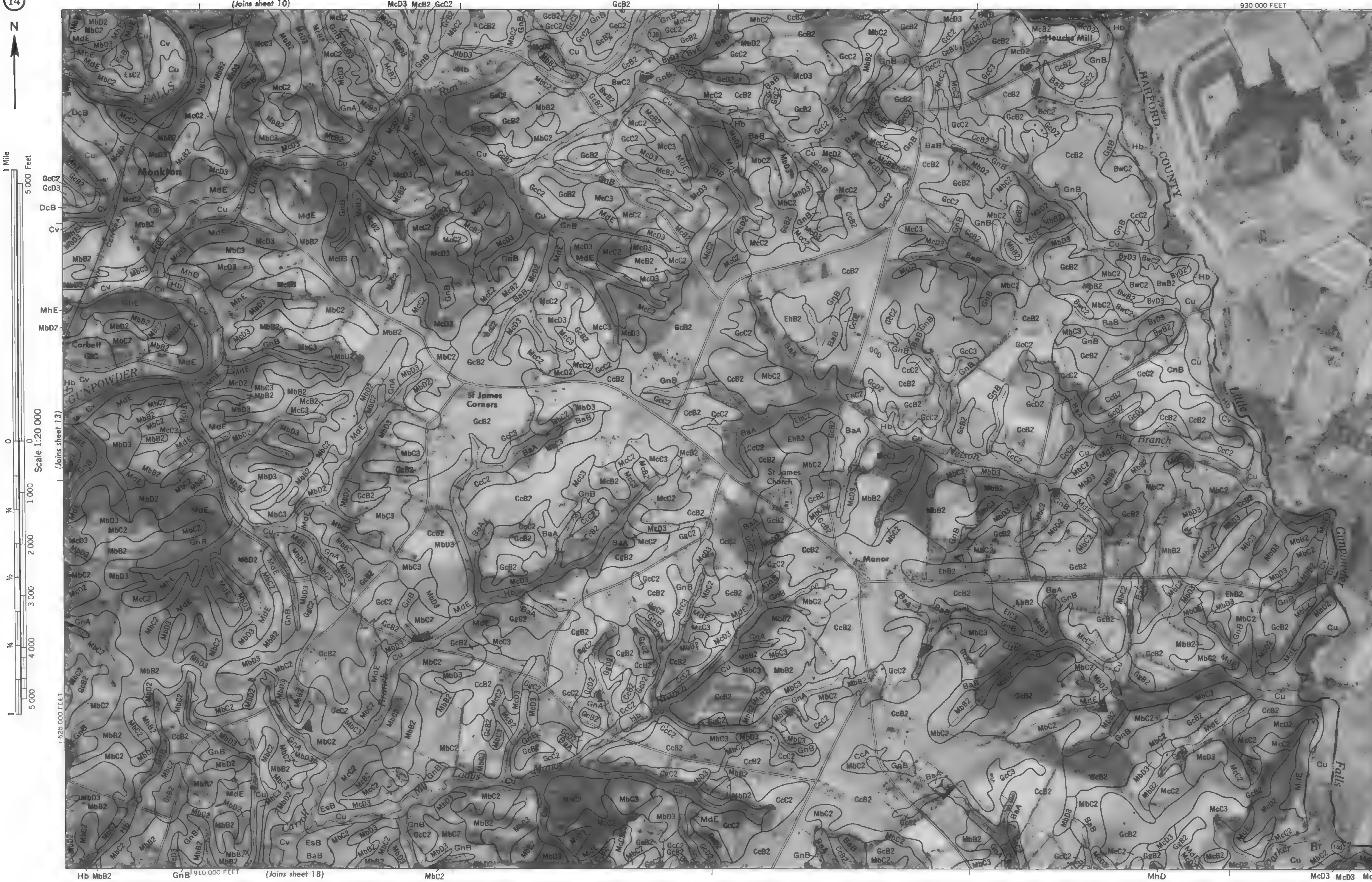
BALTIMORE COUNTY, MARYLAND NO. 12

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 13

BALTIMORE COUNTY, MARYLAND NO. 13

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 14



Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

BALTIMORE COUNTY, MARYLAND NO. 14

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 15

BALTIMORE COUNTY, MARYLAND NO. 15

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830 000 FEET

840 000 FEET

855 000 FEET

570 000 FEET

620 000 FEET

610 000 FEET

560 000 FEET

833 000 FEET

3 000 AND 5 000-FOOT GRID TICKS

(Joins sheet 32)

(Joins sheet 11)

(Joins sheet 16)

(Joins sheet 20)

Fowblesburg

Boring

Woodensburg

Pleasant Grove

Piney Grove Church

Montrose Chapel

RESERVOIR

LIBERTY RESERVATION

LIBERTY DAM

NORTH BRANCH PATAPSCO RIVER

CARROLL COUNTY

MARYLAND

WESTERN

15

N

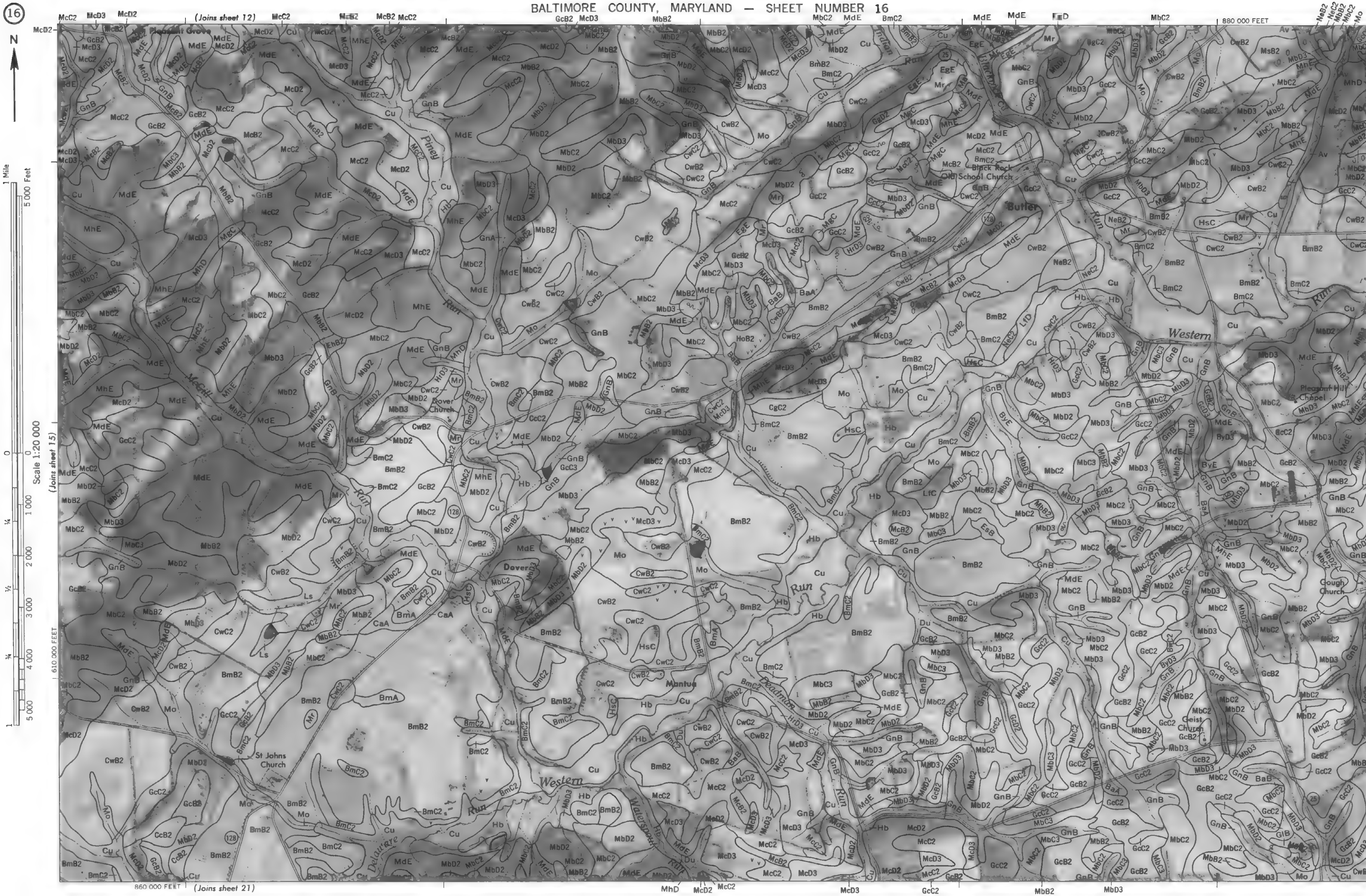
1 Mile

5 000 Feet

Scale 1:20 000

16

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 16



Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

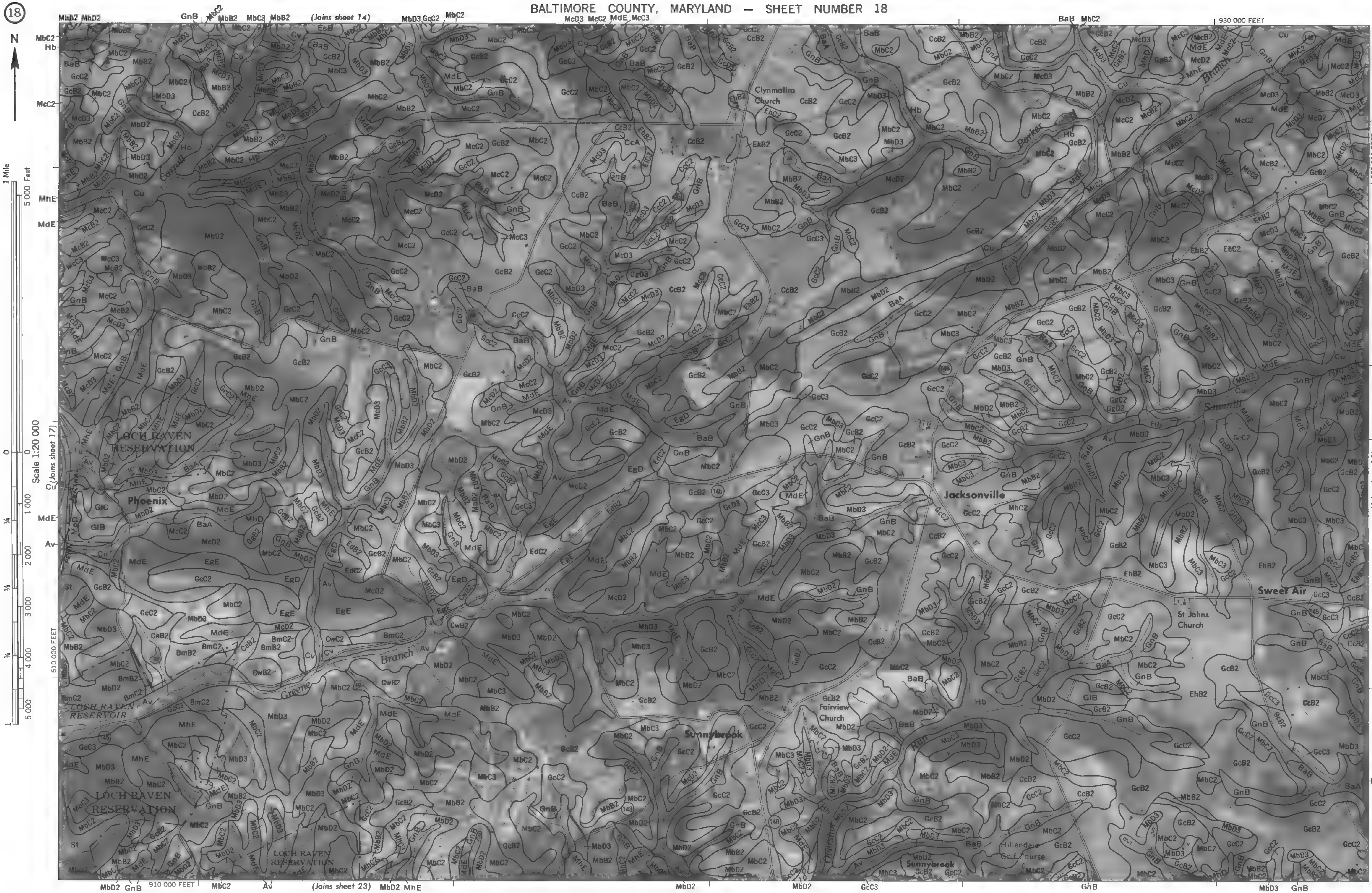
BALTIMORE COUNTY, MARYLAND NO. 16

BALTIMORE COUNTY, MARYLAND NO. 17

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 18



Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

BALTIMORE COUNTY, MARYLAND NO. 18

BALTIMORE COUNTY, MARYLAND NO. 19
This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

935 000 FEET

620 000 FEET

610 000 FEET

607 000 FEET

958 000 FEET

962 000 FEET

955 000 FEET

(Joins sheet 18)

(Joins lower right)

(Joins sheet 25)

(Joins sheet 24)

(Joins inset)

2 000 AND 3 000-FOOT GRID TICKS

19

N

1 Mile

5 000 Feet

Scale 1:20 000

HARFORD COUNTY

PENNSYLVANIA

MARYLAND

Little Gunpowder Falls

Big Gunpowder Falls

Branch

Sawmill

Locust Hill

Carroll Manor School

Union Church

Baldwin Station

2

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 2

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station

BALTIMORE COUNTY, MARYLAND NO. 2

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 20

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

BALTIMORE COUNTY, MARYLAND NO. 20

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 21

BALTIMORE COUNTY, MARYLAND NO. 21

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

22

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 22

N

(Joins sheet 17)

905 000 FEET

605 000 FEET

Scale 1:20 000

1 Mile 5 000 Feet

0 0 ¼ 1 000 ½ 2 000 ¾ 4 000 1 5 000

(Joins sheet 21)

590 000 FEET

885 000 FEET

(Joins sheet 28)

(Joins sheet 23)

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station

BALTIMORE COUNTY, MARYLAND NO. 22

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 23

23

N

BALTIMORE COUNTY, MARYLAND NO. 23

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system

910 000 FEET

930 000 FEET

505 000 FEET

595 000 FEET

(Joins sheet 18)

(Joins sheet 22)

(Joins sheet 24)

(Joins sheet 29)

LOCH RAVEN RESERVOIR

Cambria

Sunnybrook

Hillendale Golf Course

Blenheim

St Johns Church

Springdale

Warren

Longview

Golf Course

Dulaney High School

Springlake

Manor View

Meadowcliff

Scale 1:20 000

1 Mile

5 000 Feet

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.
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BALTIMORE COUNTY, MARYLAND NO 24

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 25

(Joins inset, sheet 19)

960 000 FEET

605 000 FEET

595 000 FEET

980 000 FEET

(Joins sheet 24)

(Joins sheet 31)

25

N

1 Mile

5 000 Feet

Scale 1:20 000

BALTIMORE COUNTY, MARYLAND NO. 25

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture Soil Conservation Service, and the Maryland Agricultural Experiment Station.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system

(Joins sheet 20)

N

(Joins sheet 32)

(Joins inset B, sheet 11)

(Joins sheet 27)

Scale 1:20 000

1 Mile — ¾ — ½ — ¼ — 0

5 000 Feet — 4 000 — 3 000 — 2 000 — 1 000 — 0

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.
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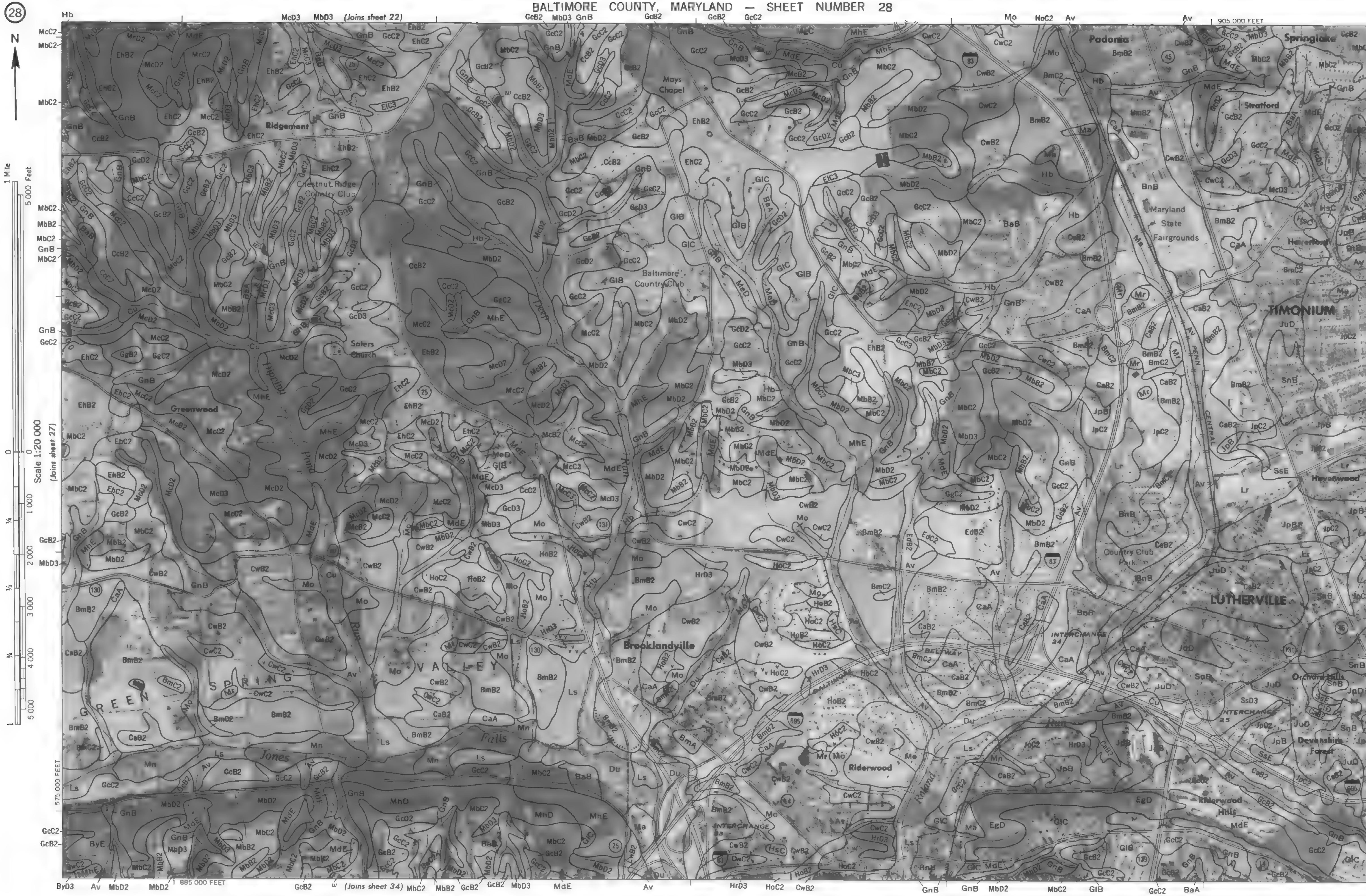
BALTIMORE COUNTY, MARYLAND NO. 26

BALTIMORE COUNTY, MARYLAND NO. 27
This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

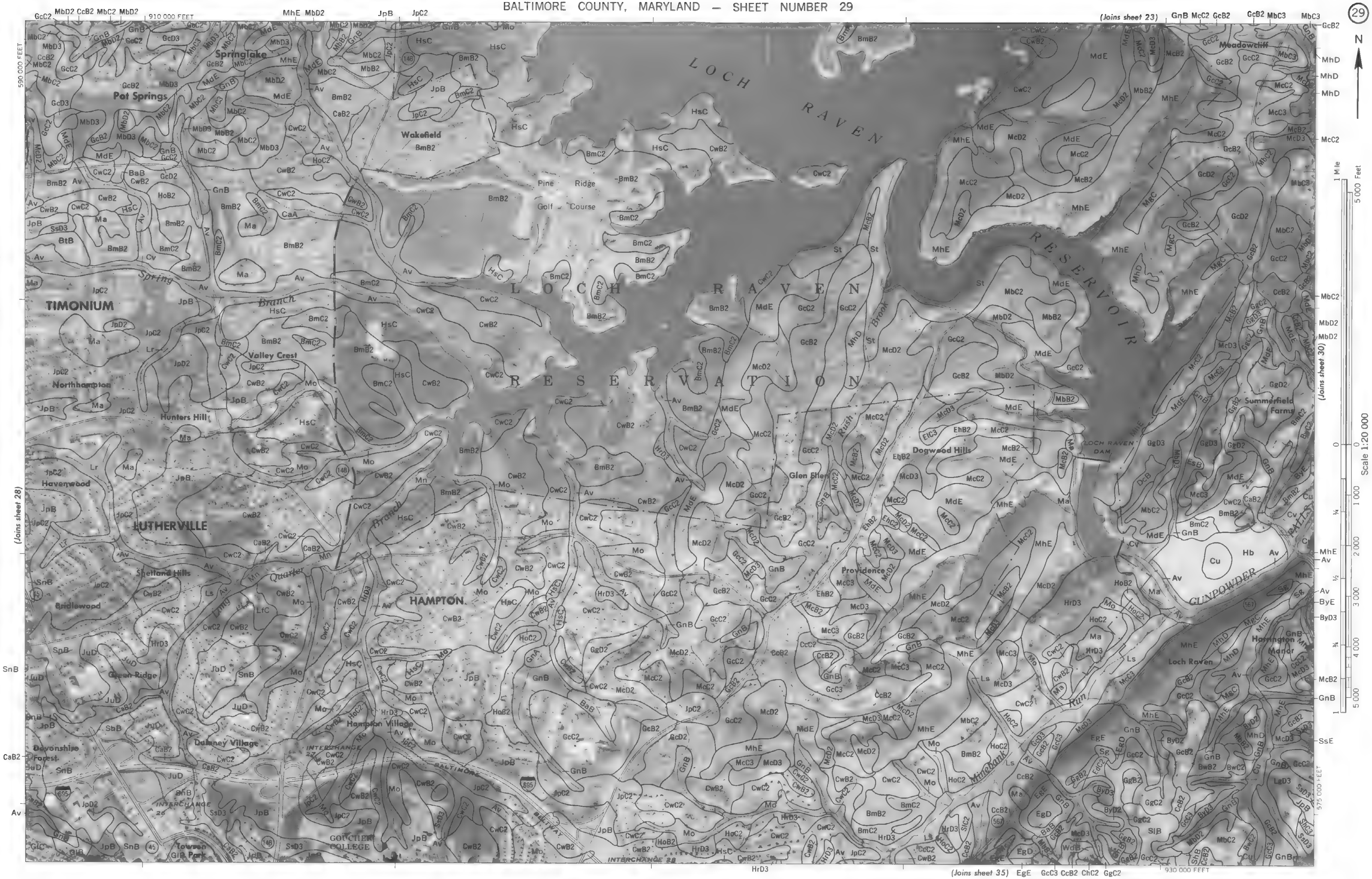


Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.
This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

BALTIMORE COUNTY MARYLAND NO. 28

BALTIMORE COUNTY, MARYLAND NO. 29

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system



BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 3

BALTIMORE COUNTY, MARYLAND NO. 3

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system

910 000 FEET

685 000 FEET

675 000 FEET

930 000 FEET

YORK COUNTY, PENNSYLVANIA

MARYLAND

HARFORD COUNTY

(Joins sheet 2)

(Joins sheet 6)

Gorsuch Mills

West Liberty

Pine Grove Memorial Ch

Deer Creek

Mill Creek

Plumtree Run

3

N

1 Mile

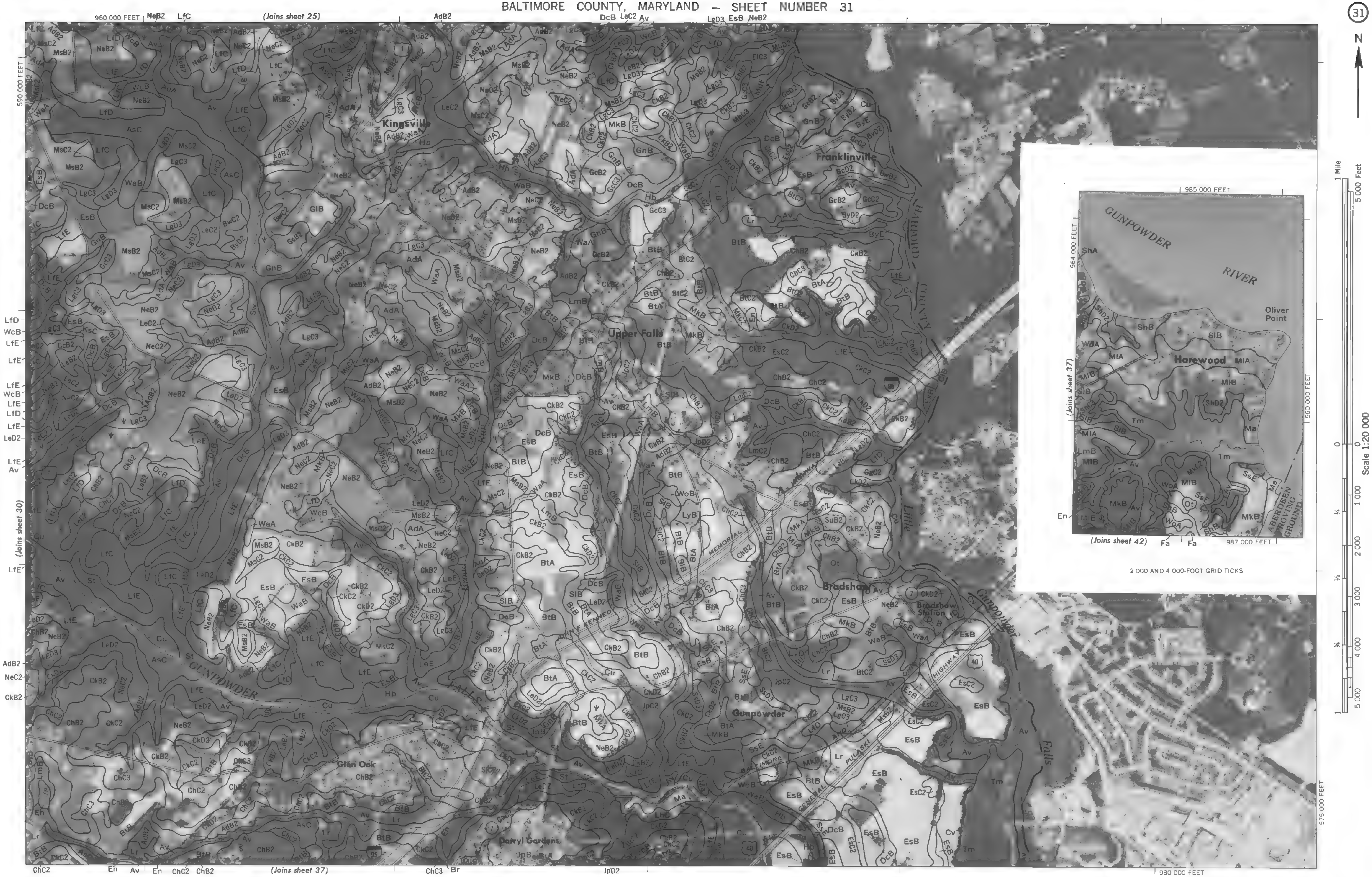
5 000 Feet

Scale 1:20 000

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 31



BALTIMORE COUNTY, MARYLAND NO. 31

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station. Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.
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BALTIMORE COUNTY, MARYLAND NO. 33

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Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system

(34)

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 34

(Joins sheet 28)

N

Scale 1:20 000

1 Mile — 5 000 Feet

(Joins sheet 33)

(Joins sheet 35)

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

BALTIMORE COUNTY, MARYLAND NO. 34

35

N

910 000 FEET

930 000 FEET

570 000 FEET

560 000 FEET

(Joins sheet 34)

(Joins sheet 36)

(Joins sheet 29)

TOWSON
(county seat)

BALTIMORE CITY

PARKVILLE

RODGERS FORGE

Towson Park

GOUCHER COLLEGE

Campus Hills

INTERCHANGE 28

Mitbank Run

Oakleigh

Coventry

Hazel Hill

Cromwood

Joppa Heights

Harford Hills

Baynesville

Towson Estates

PAVED AREA

Southland Hills

Greenbrier

TOWSON STATE COLLEGE

Fellowship Forest

Donnybrook

Knollwood

Yorkleigh

Wiltondale

Yorktown

Country Club of Maryland

Stoneleigh

Glendale

Loch Hill

Annette

Idlewylde

Knettishall

Ridgefield

Oakleigh Manor

Joppa Manor

Woodcroft

Edgewood Park

Loch Raven Heights

PAVED AREAS

Loch Raven Village

Hillendale

Hillendale Farms

Hillendale Park

Kings Ridge

Parkville Heights

Laureldale

Harford Park

Villa Cresta

HERRING RUN

PAVED AREAS

INTERCHANGE 30

INTERCHANGE 31

1 Mile

5 000 Feet

Scale 1:20 000

BALTIMORE COUNTY, MARYLAND NO. 35

This map is one of a soil compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 36

N

1 Mile

5 000 Feet

Scale 1:20 000

(Joins sheet 30) GnB GnB McC3 EsB LeC2 MbB2 LgD3 NeB2 BwB2 LgC3 CcB2 GcB2 GnB ShC3 Fs CkB2 Fs 955 000 FEET BtA

GnB JpC2 JpD2

CkB2 BtB CkD2

CkB2

570 000 FEET

GaC

CmB

(Joins sheet 37)

(Joins sheet 35)

BALTIMORE CITY

560 000 FEET

935 000 FEET

DcB (Joins sheet 40) LyD CmB Av

PERRY HALL

PAVED AREA

Cub Hill

Oak Summit

CARNEY

Carney Grove

Thornwood Park

Necker

Glenside Park

Ridge Grove

PARKVILLE

Fullerton

Rumy Hill

Whitemarsh

Run

Camp Chapel Church

INTERCHANGE 37

INTERCHANGE 34

INTERCHANGE 3

BELTWAY

HIGHWAY

JOHN F KENNEDY MEMORIAL

water

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture Soil Conservation Service, and the Maryland Agricultural Experiment Station.

BALTIMORE COUNTY, MARYLAND NO. 36

(37)

N

Scale 1:20 000

1 Mile

5 000 Feet

BALTIMORE COUNTY, MARYLAND NO. 37

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

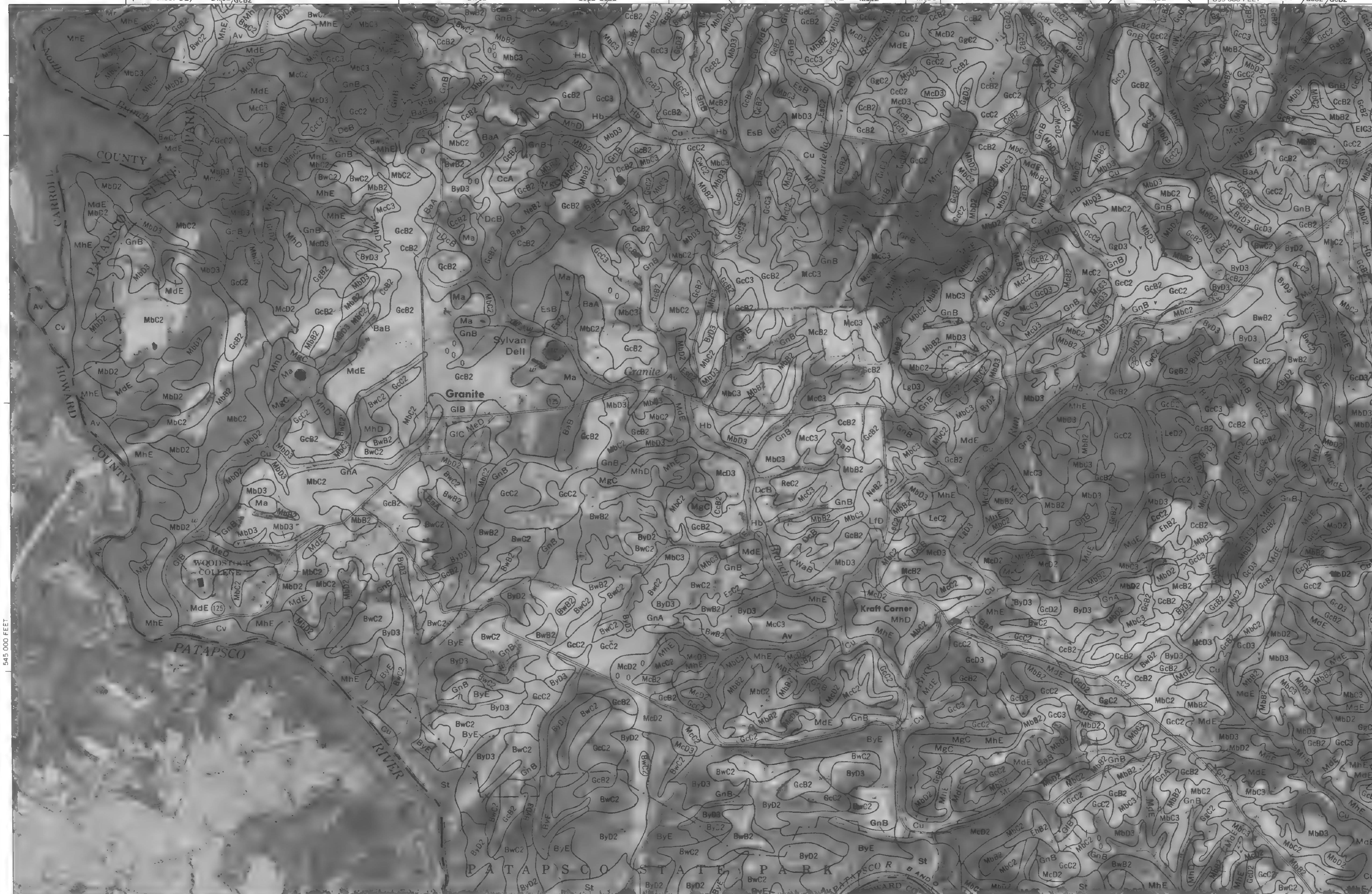
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

38

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 38

N

(Joins sheet 32)



835 000 FEET

855 000 FEET

555 000 FEET

545 000 FEET

(Joins inset A, sheet 46)

(Joins inset B, sheet 46)

(Joins 43)

(Joins sheet 39)

Scale 1:20 000

1 Mile

5 000 Feet

0 1 000 2 000 3 000 4 000 5 000

BALTIMORE COUNTY, MARYLAND NO. 38

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

BALTIMORE COUNTY, MARYLAND NO. 39

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station. Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 4

4

N

Scale 1:20 000

1 Mile

5 000 Feet

(Joins inset B, sheet 7)

(Joins sheet 1)

(Joins sheet 5)

(Joins sheet 8)

880 000 FEET

860 000 FEET

670 000 FEET

655 000 FEET

PRETTYBOY RESERVOIR

PRETTYBOY RESERVOIR

Gunpowder Church

St Peters Church

Abraham Church

Beckleysville

Sixth District School

Spook Hill

Poplar Run

Grave Run

Georges Run

Frog Hollow

Hollow Coue

PRETTYBOY RESERVOIR

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

BALTIMORE COUNTY, MARYLAND NO. 4

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.
This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

BALTIMORE COUNTY, MARYLAND NO. 40

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 41

41

N

960 000 FEET

555 000 FEET

545 000 FEET

980 000 FEET

(Joins sheet 37)

(Joins sheet 40)

(Joins sheet 42)

(Joins sheet 45)

MIDDLE RIVER

CENTRAL PENN

PAVED AREA

MARTIN MARIETTA AIRPORT

FROG MORTAR CREEK

DARK HEAD CR

MIDDLE RIVER

DUNDEE CREEK

SALTPETER CREEK

SENECA CREEK

ABERDEEN PROVING GROUND

Chase

Sandy Point

Marshy Point

Hawthorne

Stansbury Manor

Stansbury Estates

Stansbury Creek

Seneca Park

ISLAND

CARROLL

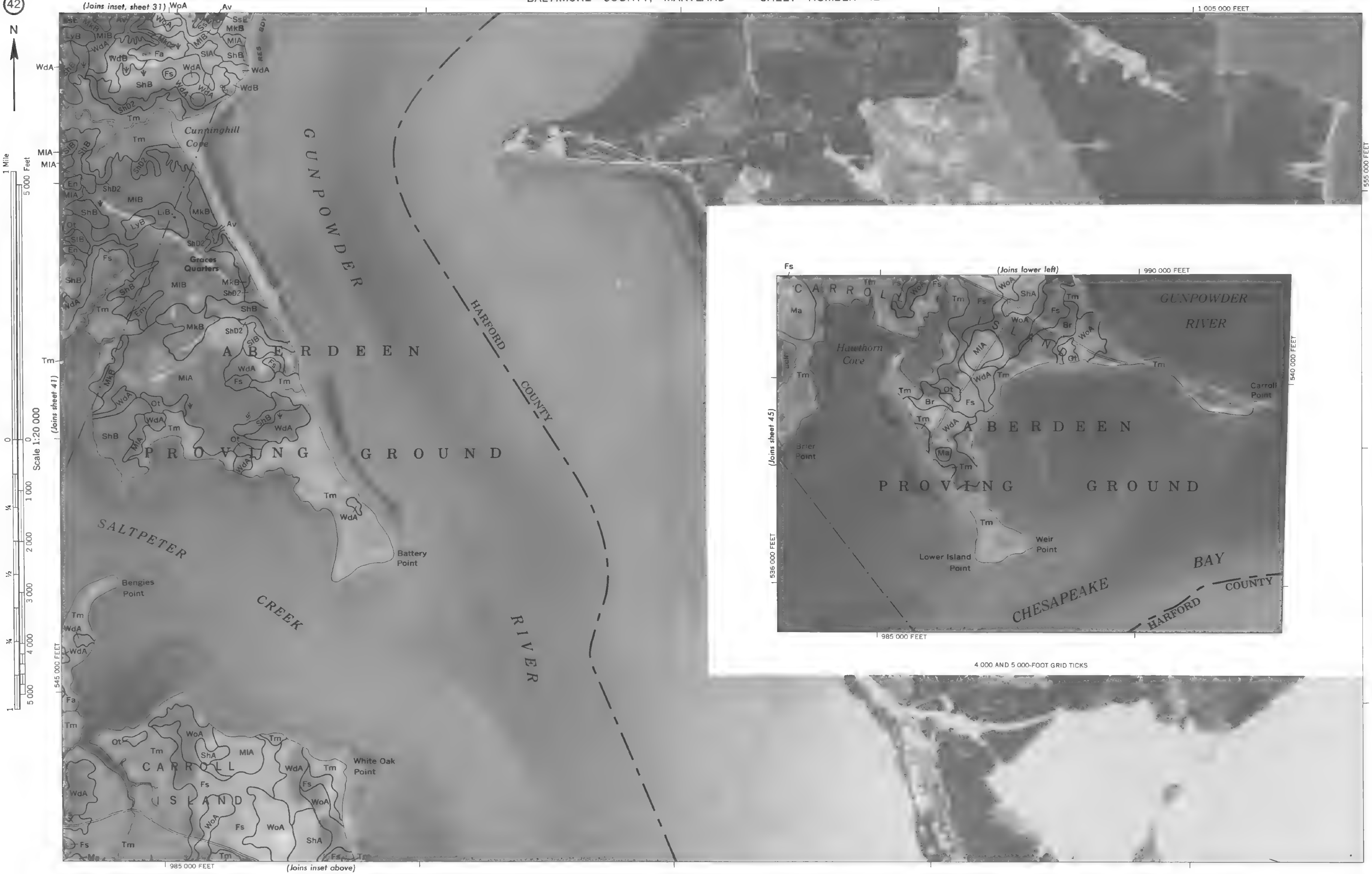
1 Mile

5 000 Feet

Scale 1:20 000

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station

Photobase from 1971 aerial photography. Position of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system



Photobase from 1971 aerial photography. Positions of 5,000-foot grid and ticks are approximate and based on the Maryland coordinate system.
This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

BALTIMORE COUNTY, MARYLAND NO. 42

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 43

(43)

N

(Joins 38)

(Joins sheet 39)

(Joins inset B, sheet 46)

(Joins sheet 46)

860 000 FEET

880 000 FEET

540 000 FEET

525 000 FEET

Scale 1:20 000

1 Mile

5 000 Feet

BALTIMORE COUNTY, MARYLAND NO. 43

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system

PATAPSCO STATE PARK

HOWARD COUNTY

PATAPSCO RIVER

Hollofield

Dogwood

Belmont

Harristown

CATONSVILLE

CATONSVILLE MANOR

WOODLAWN

Windsor Terrace

Franklintown

Westowne

West Hills

Mount DeSales

Kenwood

BALTIMORE CITY

Cedar Branch

Dead Run

INTERCHANGE 17

INTERCHANGE 16

INTERCHANGE 15

INTERCHANGE 14

44

N

Scale 1:20 000

1 Mile 5 000 Feet

0 0

¼ 1 000

½ 2 000

¾ 4 000

1 5 000

CIB WdB

LmB (Joins sheet 40)

BuB

WdA ShB Av

955 000 FEET

540 000 FEET

MkB

ShD2

(Joins sheet 45)

530 000 FEET

935 000 FEET

(Joins sheet 48)

ROSEDALE

ESSEX

Chesaco Park

Eastpoint

DUNDALK

Fairlawn

Gray Manor

Greenmarsh Point

Baltimore City Sewage Treatment Works

Wetherby Point

Cox Point

North Point

Walnut Point

Beachwood

Country Ridge

Walters

Back River

Bread and Cheese Creek

NORTHEAST CREEK

HERRING RUN

BACK RIVER NECK

DEEP CREEK

PATAPSCO RIVER

BALTIMORE CITY

INDUSTRIAL AREA

PAVED AREAS

PROPOSED INTERSTATE HIGHWAY

GENERAL PULASKI HIGHWAY AND BALTIMORE AND OHIO RAILROAD

CENTRAL

PENN

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station

BALTIMORE COUNTY, MARYLAND NO. 44

BALTIMORE COUNTY, MARYLAND NO. 45
This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system

960 000 FEET

(Joins sheet 41)

540 000 FEET

(Joins sheet 44)

530 000 FEET

(Joins inset, sheet 42)

980 000 FEET

(Joins sheet 49)

45

N

1 Mile

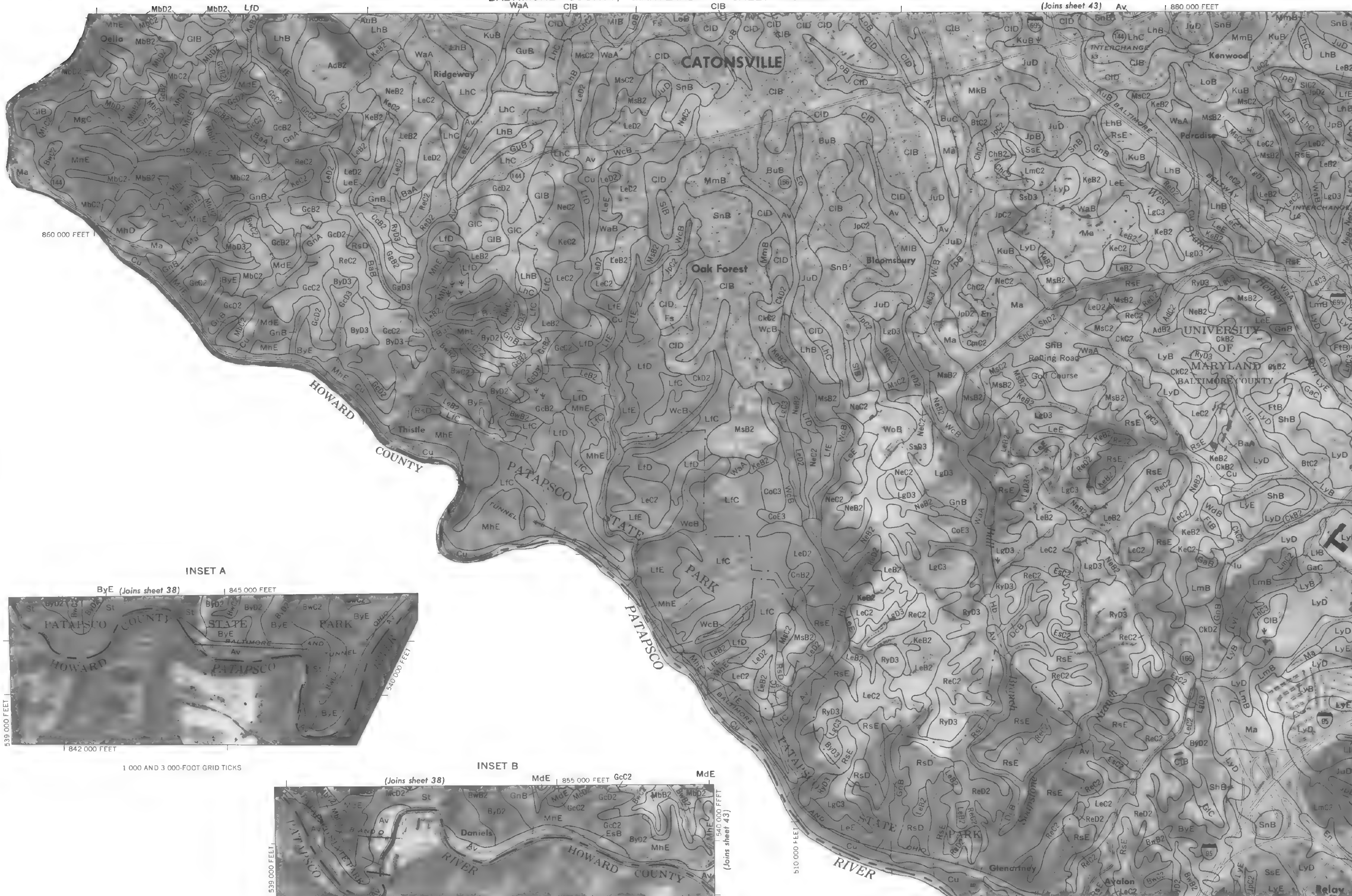
5 000 Feet

Scale 1:20 000

Hawthorne
Clark Point
DARK HEAD CR
Stansbury Estates
STANSBURY CR
MARTIN MARIETTA AIRPORT
Strawberry Point
FROG MORTAR CR
HOPKINS CREEK
Piney Point
Middleborough
Barren Point
Wilson Point
Galloway Point
Log Point
MIDDLE RIVER
NORMAN CREEK
Cape May Beach
Hogpen Creek
GALLOWAY CREEK
SENECA CREEK
CARROLL ISLAND
ABERDEEN PROVING GROUND
Brier Point
Miami Beach
Bowley Bar
Turkey Point
Sue Island
SUE CREEK
Booby Bar
Breezy Point Beach
Wells Point
BROWNS CREEK
CHESAPEAKE BAY
BACK RIVER
Muddy Gut
NECK

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 46

N



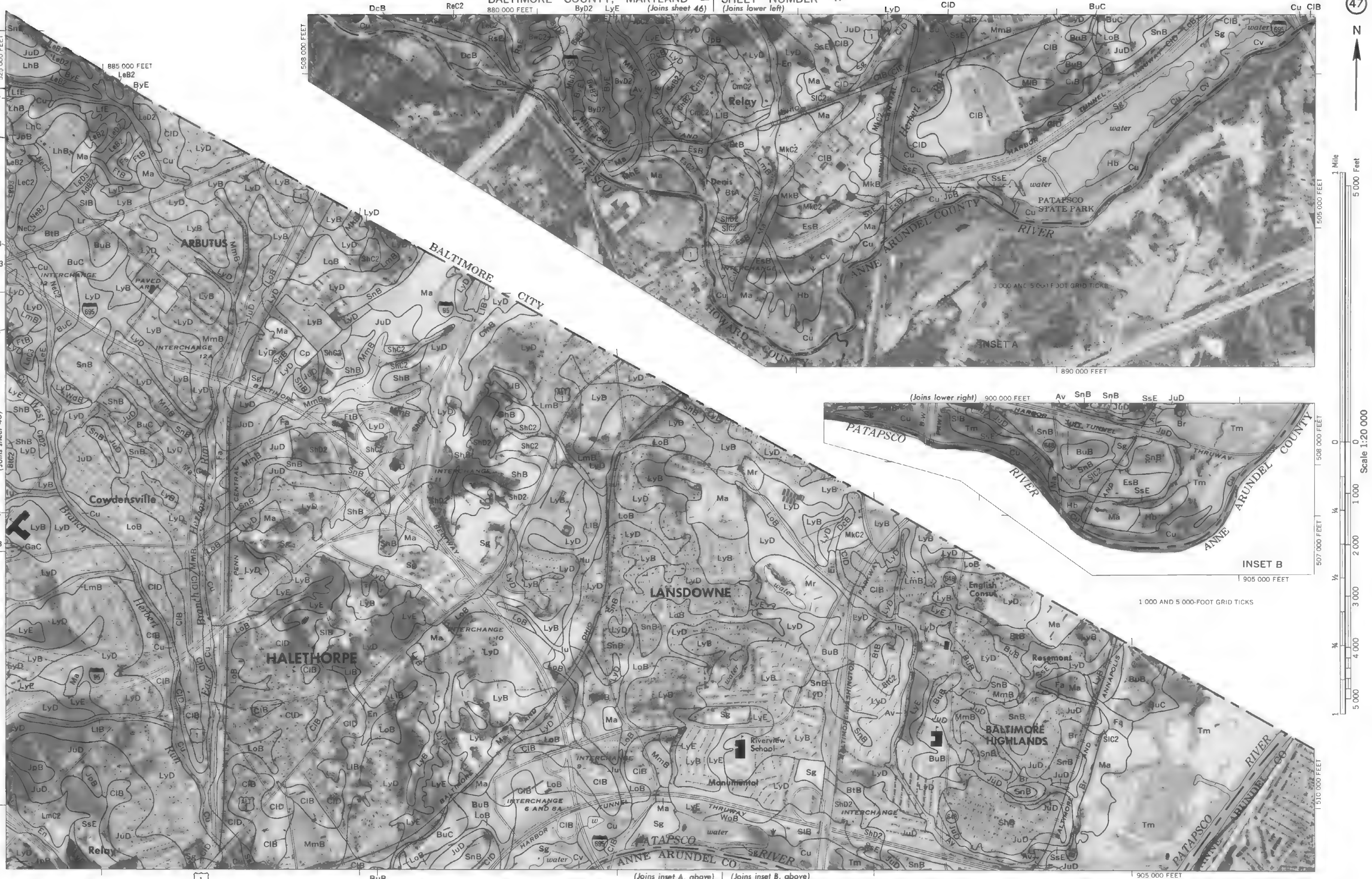
Scale 1:20 000

1 Mile | ¾ | ½ | ¼ | 0

5 000 Feet | 4 000 | 3 000 | 2 000 | 1 000 | 0

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.
This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

BALTIMORE COUNTY, MARYLAND NO. 46



BALTIMORE COUNTY, MARYLAND NO. 47

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station

Photobase from 1971 aerial photography. Positions of 5,000 foot grid ticks are approximate and based on the Maryland coordinate system

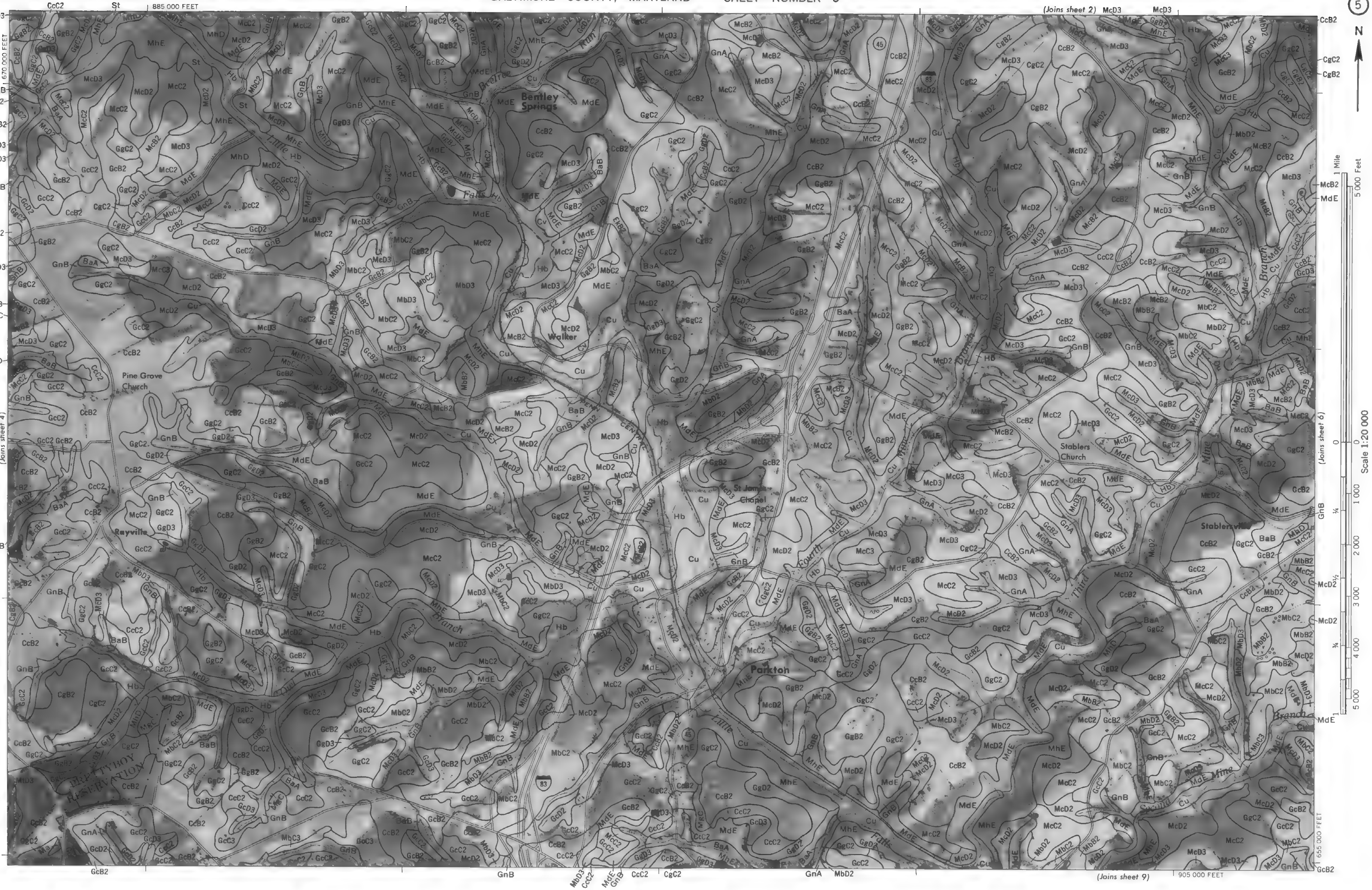
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

BALTIMORE COUNTY, MARYLAND NO. 48

BALTIMORE COUNTY, MARYLAND NO. 49

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system



BALTIMORE COUNTY, MARYLAND NO. 5

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

50

N

1 Mile
5 000 Feet
0
0
Scale 1:20 000
¼
1 000
½
2 000
¾
3 000
1
4 000
1¼
5 000

(Joins sheet 48)

955 000 FEET

505 000 FEET

495 000 FEET

935 000 FEET

BALTIMORE CITY

PATAPSCO

BEAR CREEK

Fort Carroll

Lloyd Point

SPARROWS POINT

Sparrows Point

EDGEMERE

Lodge Forest

Fort Howard

North Point

OLD ROAD BAY

North Point Creek

JONES CREEK

PATAPSCO RIVER NECK

ANNE ARUNDEL COUNTY

CHESAPEAKE BAY

(Joins sheet 51)

Photobase from 1971 aerial photography. Positions of 5,000 foot grid ticks are approximate and based on the Mary and coordinate system.

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

BALTIMORE COUNTY, MARYLAND NO. 50

BALTIMORE COUNTY, MARYLAND NO. 51

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 6

6

N

930 000 FEET

670 000 FEET

660 000 FEET

1 Mile

5 000 Feet

Scale 1:20 000

0 0 ¼ ½ ¾ 1

1 000 2 000 3 000 4 000 5 000

(Joins sheet 3)

(Joins sheet 5)

(Joins sheet 10)

HARFORD COUNTY

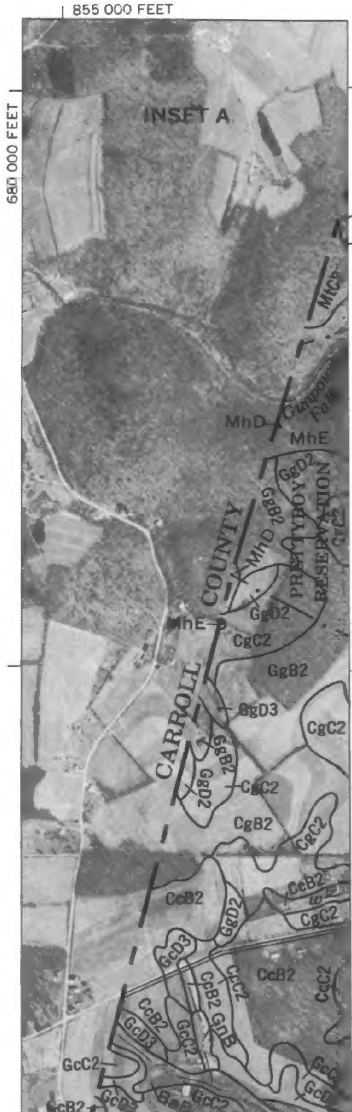
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

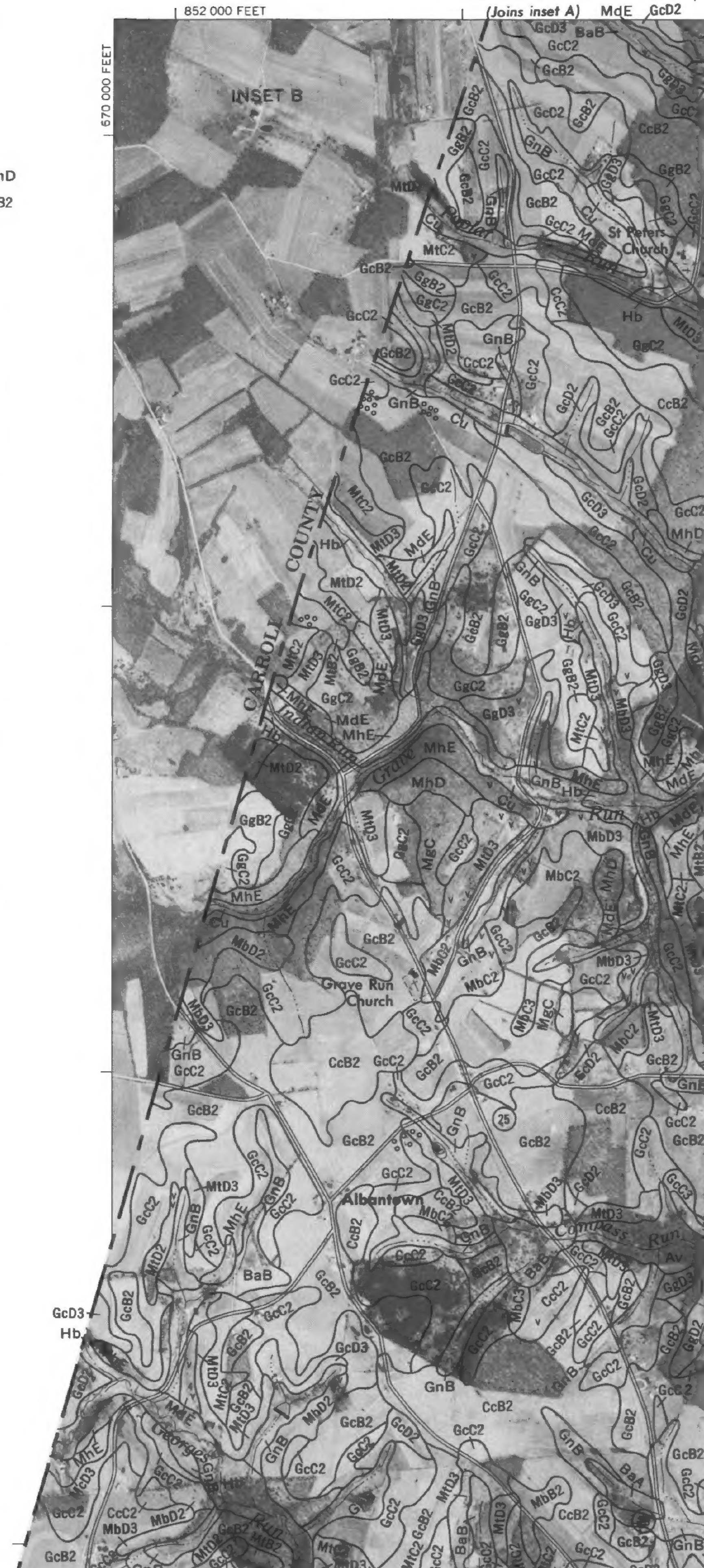
BALTIMORE COUNTY, MARYLAND NO. 6

BALTIMORE COUNTY, MARYLAND NO. 7

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.



2 000 AND 5 000-FOOT GRID TICKS



3 000 AND 5 000-FOOT GRID TICKS

BALTIMORE COUNTY, MARYLAND — SHEET NUMBER 8

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.

BALTIMORE COUNTY, MARYLAND NO. 8

This map is one of a set compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Maryland Agricultural Experiment Station.
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Maryland coordinate system.

BALTIMORE COUNTY, MARYLAND NO. 9

BALTIMORE COUNTY, MARYLAND

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads

- Divided
- Good motor
- Poor motor
- Trail

Highway markers

- National Interstate
- U. S.
- State or county

Railroads

- Single track
- Multiple track
- Abandoned

Bridges and crossings

- Road
- Trail
- Railroad
- Ferry (FY)
- Ford (FORD)
- Grade
- R. R. over
- R. R. under

- Buildings
- School
- Church
- Mine and quarry
- Gravel pit
- Power line
- Pipeline
- Cemetery
- Dams
- Levee
- Tanks
- Well, oil or gas
- Forest fire or lookout station
- Windmill
- Located object

BOUNDARIES

- National or state
- County
- Minor civil division
- Reservation
- Land grant
- Small park, cemetery, airport
- Land survey division corners

DRAINAGE

Streams, double-line

- Perennial
- Intermittent

Streams, single-line

- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements
  - Unclassified
- Canals and ditches

Lakes and ponds

- Perennial (water, w)
- Intermittent (int)

- Spring
- Marsh or swamp
- Wet spot
- Drainage end or alluvial fan

RELIEF

Escarpments

- Bedrock
- Other
- Short steep slope
- Prominent peak

Depressions

	Large	Small
Crossable with tillage implements		
Not crossable with tillage implements		
Contains water most of the time		

SOIL SURVEY DATA

- Soil boundary and symbol (Dx)
- Gravel
- Stoniness
  - Stony
  - Very stony
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gully
- Paved area (P. A.)